

Quality Assurance Project Plan

Shelton Cleaners and Laundry

by
Pamela B. Marti, L.G., L.HG.

Washington State Department of Ecology
Environmental Assessment Program
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August 2002

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Approvals

Approved by:

November 6, 2002

Panjini Balaraju, TCP, Southwest Regional Office

Date

Approved by:

November 6, 2002

Bob Warren, Unit Supervisor, TCP, Southwest Regional Office

Date

Approved by:

November 7, 2002

Rebecca Lawson, Section Manager, TCP, Southwest Regional Office

Date

Approved by:

November 7, 2002

Pamela B. Marti, Project Lead, Watershed Ecology Section

Date

Approved by:

November 5, 2002

Darrel Anderson, Unit Supervisor, Nonpoint Studies Unit

Date

Approved by:

November 4, 2002

Will Kendra, Section Manager, Watershed Ecology Section

Date

Approved by:

November 5, 2002

Stuart Magoon, Director, Manchester Environmental Laboratory

Date

Approved by:

November 5, 2002

Cliff Kirchmer, Ecology Quality Assurance Officer

Date

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Abstract

Tetrachloroethylene (PCE) contamination of shallow groundwater was discovered in 1997 during an environmental site assessment of a property in Shelton, Washington. PCE was detected at a concentration of 130 µg/L in groundwater from a temporary shallow boring. The most likely source of the contamination was identified as the dry cleaning facility located adjacent to the property where the site assessment was being conducted. In 1993, a new dry cleaning machine was installed. As the old cleaning machine was being removed, an unknown quantity of dry cleaning solvent, assumed to be PCE, was reportedly spilled and infiltrated through the broken asphalt in the alley behind the building. The spill event is assumed to be the source of groundwater contamination. In July 1998, four shallow (15 feet deep) monitoring wells were installed to sample the groundwater. PCE contamination has primarily been detected in the well located where the spill was reported, with concentrations ranging from 280 ug/L (July 1998) to 25 ug/L (September 2000). Groundwater data indicate that contaminant concentrations are decreasing. For this project, four additional wells have been installed to gain a better understanding of contaminant concentrations at deeper depths. Three of the wells were installed adjacent to the dry cleaners to a depth of 45 feet. The fourth well, which is assumed to be downgradient of the site, was installed to a depth of 60 feet. Ground water samples will be collected from the eight monitoring wells quarterly over a one-year period to determine if PCE and its breakdown products (trichloroethylene, dichloroethylene, and vinyl chloride) are present at deeper depths of the aquifer, and if concentrations are below the Model Toxic Control Act clean-up levels. This information will assist in determining if the site should be considered for no further action or will require additional investigation or possible remedial action.

Background/Problem Statement

Tetrachloroethylene (PCE) contamination of the shallow groundwater was discovered in 1997 during an environmental site assessment/subsurface investigation of a property in Shelton, Washington (Figure 1). PCE was detected at a concentration of 130 µg/L from a temporary shallow boring. The Model Toxic Control Act (MTCA) cleanup level for PCE in groundwater is 5 µg/L.

The Department of Ecology (Ecology) was notified of the contamination when it received copies of the Environmental Site Assessment Reports in June 1997. Based on these reports, the site was listed on Ecology's Confirmed and Suspected Contaminated Sites List (ISIS List) in December 1997 as Shelton Laundry and Cleaners. Recently the site was ranked based on the Washington Ranking System.

The most likely source of the contamination was identified as the dry cleaning facility located adjacent to the property where the site assessment was being conducted. The commercial laundry and dry cleaning facility has been in operation since 1935. In 1993, a new dry cleaning machine was installed. As the old cleaning machine was being removed, an unknown quantity of dry cleaning solvent, assumed to be PCE, was reportedly spilled and infiltrated through the broken asphalt in the alley behind the building. This spill event is assumed to be the source of groundwater contamination.

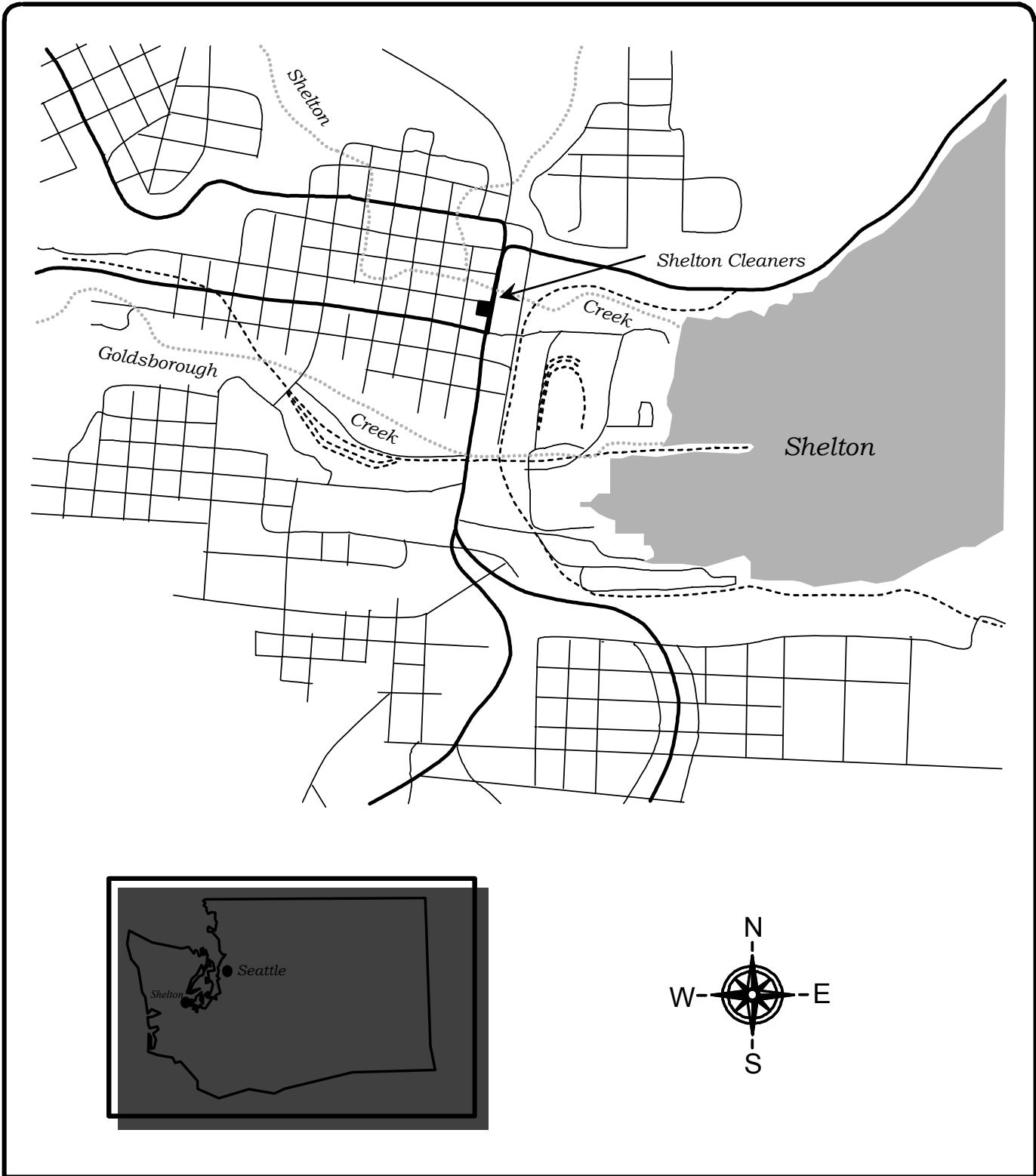


Figure 1: Shelton Cleaners and Laundry Site Location

A number of investigations have been conducted at the site during 1997 and 1998. During these investigations, several shallow borings were drilled to collect both soil and groundwater samples. In July 1998, four shallow (15 feet deep) monitoring wells were installed to sample the groundwater. Four rounds of groundwater monitoring were conducted at the site between July 1998 and September 2000.

PCE contamination has primarily been detected in the well located where the spill was reported, with concentrations ranging from 280 ug/L (July 1998) to 25 ug/L (September 2000). Groundwater data collected since 1998 indicate that contaminant concentrations are decreasing. For this project, four additional wells have been installed to gain a better understanding of contaminant concentrations at deeper depths. In undiluted form, PCE is a dense non-aqueous phase liquid (DNAPL) and has a tendency to sink until it reaches a lower permeable layer in the aquifer. Three of the wells were installed beside three of the existing shallow wells to a depth of 45 feet. The fourth well, which is assumed to be downgradient of the site, was installed to a depth of 60 feet. Soils beneath the site consist of sand and gravel with varying amounts of silt. A low permeable layer was not encountered during installation of any of the monitoring wells.

Project Description

Groundwater data collected from the site since 1998 from the shallow monitoring wells indicate that contaminant concentrations are decreasing. The primary goal of this project is to provide the Toxic Cleanup Program (TCP) with current groundwater data for PCE and its breakdown products. This data will allow TCP to determine whether the concentrations are above or below MTCA clean-up levels, and if the site requires additional investigation or remedial action.

Tasks to meet these objectives are:

- Collect ground water samples quarterly for one year for the target volatile organic analytes tetrachloroethylene, trichloroethylene, dichloroethylene, and vinyl chloride from the eight monitoring wells (Figure 2).
- Measure water levels in the eight monitoring wells monthly to better determine the groundwater flow direction. In 1998, groundwater flow direction was reported to be toward the marine waters of Oakland Bay which is approximately 2000 feet east of the site. In 1999 and 2000, groundwater flow direction appeared to be toward the southwest.
- Prepare data summary sheets at the completion of each sampling event, along with ground water contours maps; prepare a technical memorandum at the completion of all sampling summarizing significant findings.

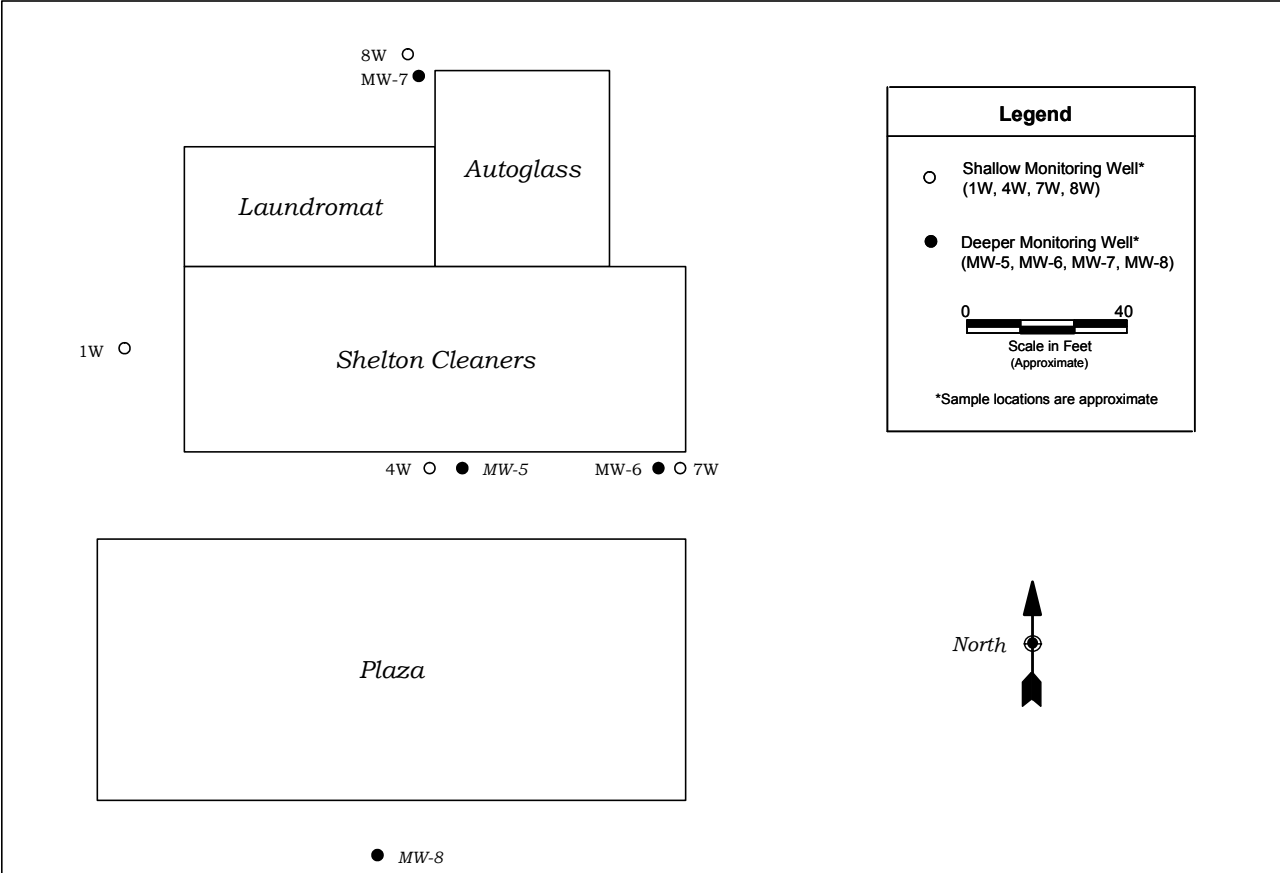


Figure 2: Shelton Cleaners and Laundry Sample Locations

Responsibilities

The project will be organized with key personnel performing the following functions:

Name	Duties	Phone
Pam Marti	Project Lead	(360)407-6768
Panjini Balaraju	QAPP and Report Review	(360)407-6243
John Weakland	Analysis Supervisor	(360)871-8820
Pam Covey	Sample Tracking	(360)871-8827
Darrel Anderson	QAPP and Report Review	(360)407-6453
Will Kendra	QAPP and Report Review	(360)407-6698
Cliff Kirchmer	QAPP Review and Technical Assistance	(360)407-6455
Stuart Magoon	Laboratory Director	(360)871-8813

Schedule

This project is scheduled for one year. Project milestones and projected dates of completion are listed below. At the end of one year, all data will be evaluated and summarized in a technical memorandum.

Milestone	Date
QAPP Approved	July 2002
Ground Water Sampling	July and October 2002 January and April 2003
Draft Memo	May 2003
Final Memo	June 2003

Budget

The estimated laboratory budget for this project is \$5,200, which will cover the analytical costs of the four groundwater sample collection events. The analytical costs for this project are being paid for by the toxics cleanup program, and the costs reflect the 50% discount that Ecology programs receive at Manchester Lab (i.e., actual lab costs are \$10,400).

Data Quality Objectives

For this project to succeed, the precision (random error) and bias (systematic error) of test results must be low to reveal variability in concentrations between samples. The goal for total precision (analytical and sampling) for the volatile organics will be 15% Relative Percent Difference (RPD). RPD is defined as the ratio of duplicate results and their mean expressed as a percentage.

Sampling bias will be minimized by using standard procedures for sampling, preservation, transportation and storage of the samples.

The measurement quality objectives for analysis are given in the following table.

Table 1: Measurement Quality Objectives

Parameter	Accuracy (% deviation from True Value)	Precision (RSD)	Bias (% of True Value)	Required Reporting Limit
VOAs (EPA Method 8260B)	25	10	5	1-5 ug/L

These goals are based on performance characteristics of measurements done by the Manchester Environmental Laboratory. Analytical and field quality control samples are discussed in the Quality Control Procedures section below.

Sampling Design and Field Procedures

Ground water samples will be obtained quarterly over a one-year period to determine current concentrations and distribution of PCE and its breakdown products (trichloroethylene, dichloroethylene, and vinyl chloride if present). Samples will be collected from eight monitoring wells (Figure 2) and will be assumed to be representative of the groundwater quality of the site.

The monitoring wells have been installed in two phases. Four shallow wells were installed in 1998 (1W, 4W, 7W and 8W). These wells were constructed of 1" PVC to a depth of about 15 feet with 10 foot screens. Four additional 2" PVC wells were installed for this part of the project (MW-5, MW-6, MW-7 and MW-8). Three of the wells were completed to a depth of about 45 feet with the screened interval from 35-45 feet below ground surface (bgs). The fourth well (MW-8), which is assumed to be downgradient of the site, was installed to a depth of 60 feet with the screened interval from 50-60 feet bgs.

Water levels will be measured in the eight monitoring wells monthly, as well as prior to sampling, using a commercial electric probe. Measurements will be recorded to 0.01 feet and will be accurate to 0.03 feet. Well volumes will be calculated using the height of water in the well casing above the bottom of the well.

Monitoring wells MW-5, MW-6, MW-7, and MW-8 are 2" diameter wells and will be purged and sampled using a stainless steel submersible pump, with a pump rate of less than 1-

liter/minute. These wells will be purged until field parameters (specific conductance, pH, and temperature) have stabilized or a minimum of three well volumes have been purged. Purge water from the wells will be stored on-site in 55-gallon drums. This waste will be transported and disposed of in accordance with State of Washington regulations (Chapter 173-340-400 WAC). Samples will be collected from the monitoring wells using the submersible pump into pre-cleaned vials. The pump will be decontaminated between each well by circulating laboratory grade detergent/water through the pump for five minutes, followed by a clean water rinse.

Monitoring wells 1W, 4W, 7W, and 8W are 1" diameter wells which prevent the use of the low-flow submersible pump. Due to the restrictions the well construction has placed on the options available to sample these wells, a peristaltic pump with a flow rate of less than 1-liter per minute will be used to purge the wells. Studies have shown that there can be significant changes in the solution chemistry of samples collected with suction lift devices such as a peristaltic pump. Because these pumps apply a vacuum to the groundwater sample, they can cause depressurization and degassing of the sample and thus may not be suitable for volatile and gas-sensitive analytes. To minimize the loss of volatile analytes during sample collection, the tubing will be disconnected from the pump at the completion of purging and a plastic syringe will be attached to the tubing. The tubing will be removed from the well and the syringe will be used to push the groundwater samples into pre-cleaned vials.

Because of the different sampling techniques that will be used on this project, groundwater results may not be directly comparable. To try and determine the variability between sampling methods, samples will also be collected from each 2" well using the peristaltic pump/syringe method. Results from the samples collected with the submersible pump should be comparable to results from previous Ecology studies in which this standard procedure was used.

All VOA samples will be collected free of headspace in three 40-mL glass vials with Teflon lined septa lids and preserved with 1:1 hydrochloric acid. Upon sample collection and proper labeling, all samples will be stored in an ice-filled cooler. Samples will be transported to the Ecology headquarters building in Lacey. Samples will be kept in the walk-in cooler until picked up by the laboratory courier to Ecology/EPA Manchester Environmental Laboratory in Manchester, Washington. Chain-of-custody procedures will be followed according to Manchester Environmental Laboratory protocol (Ecology, 2000). In the event that a sample is damaged during transit or testing, a new sample may be collected and submitted for analysis. The laboratory should notify the project lead as soon as possible when a sample is unsuitable. Samples will be analyzed within the maximum acceptable holding time of 14 days for volatile organics.

Laboratory Procedures

All groundwater samples will be analyzed for volatile organics using EPA SW846 Method 8260 (U.S. EPA 1986), with a detection limit of 1 to 5 µg/L. The detection limits obtained with this analytical method are necessary for this project to meet Model Toxics Control Act (MTCA) requirements.

Previous samples collected at this site prior to this project were analyzed using EPA Method 8021B for Specific Halogenated and Aromatic Hydrocarbons in Water. Data generated using the two analytical methods should be comparable.

Quality Control Procedures

Field Quality Control

Field quality control will consist of collecting field duplicates and replicating the peristaltic pump/syringe sample technique on the 2" wells. Field duplicate sample results will provide an estimate of overall sampling and analytical precision. One field duplicate will be collected at one of the monitoring wells for each sampling event. A field duplicate is a second sample from the same well using identical sampling procedures a short time after the well has equilibrated. The relative percent difference (RPD) will be calculated for each duplicate set and will be used to estimate overall precision.

To try and determine the variability between sampling methods, samples will be collected from the 2" wells using the peristaltic pump/syringe technique during each sample round.

Lab Quality Control

Routine laboratory quality control procedures will be adequate to estimate laboratory precision and accuracy for this project. Laboratory quality control tests consist of surrogate recoveries, method blanks, matrix spikes, as well as duplicate and check standards (lab control standards or LCS). Surrogate recoveries will be used to judge the accuracy for analysis of similar target analytes. Analytical precision can be estimated from duplicate and check standards, duplicate sample analysis, and duplicate spiked sample analyses. Analytical bias will be estimated from matrix spikes, matrix spike duplicates, and check standards. Recoveries from check standards provide an estimate of bias due to calibration. Mean percent recoveries of spiked sample analyses provide an estimate of bias due to interference. Laboratory staff will conduct quality assurance review of all analytical data generated at Manchester Environmental Laboratory prior to releasing the data to the project lead.

Data Review and Validation

At the completion of each sampling event, all field data and laboratory analytical data will be compiled and evaluated against the project measurement quality objectives. Data review will follow the procedures outlined in Manchester Environmental Laboratory Users Manual (Ecology 2000). Lab results will be checked for questionable or missing data. Analytical precision will be evaluated using standard statistical techniques (relative percent difference [RPD], standard deviation [s], pooled standard deviation [sp], or percent relative standard deviation [%RSD]) as appropriate. The RPD for field duplicates will be used to assess data quality.

Data Quality Assessment and Reporting

Once the data have been reviewed and validated, the project lead will determine if the data can be used toward the project goals and objectives. During the project, groundwater level measurements and data summary sheets will be sent to the project manager at the completion of each sample event. A technical memorandum will be prepared at the completion of all sampling and will include the following:

- Maps of the study area showing sample sites.
- Descriptions of field and laboratory methods.
- Discussion of data quality and the significance of any problems encountered in the analyses.
- Summary tables of field and chemical data.
- Observations on significant or potentially significant findings.
- Recommendations based on project goals.
- Complete data set and data reviews as an appendix to the report.

At the completion of the project, data suitable for archiving will be transitioned to the Environmental Information Management (EIM) database.

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