Quality Assurance Project Plan

American Plating
Post-Interim Action Monitoring

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March 2004

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Approvals:

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Abstract

American Plating, a metal electroplating company, formerly located on the Thea Foss Waterway in Tacoma, Washington, ceased operation in 1986 when it was discovered that facility operations potentially violated state dangerous waste regulations. The Washington State Department of Ecology (Ecology) conducted several site inspections from 1980 to 1985, which had determined that discharges, leaks, and spills had occurred at the site. The site had been occupied by plating companies since 1955. All companies performed metal electroplating including brass, cadmium, chromium, copper, nickel, and zinc. A preliminary site assessment conducted by the Environmental Protection Agency (EPA) in 1986 concluded that high levels of plating waste and contaminated materials were present on the site. Removal of waste material and site cleanup began in June 1987. A series of site investigations, which included the installation of 12 monitoring wells, were conducted from 1988 to 1994. An interim action was initiated by Ecology in the summer of 2003 with the primary objective of reducing the human health risk from contact with contaminated soil. The interim action included the removal of site buildings along with a concrete pad, sumps, and an underground storage tank. Soil was also excavated and removed from the site from depths of three to eight feet. Clean fill and top soil were added to the excavated areas. It is anticipated that additional soil cleanup will be performed in the future after the sale of the property. Dissolved metals (cadmium, chromium, copper, and nickel), weak acid dissociable (WAD) cyanide, as well as volatile organics (VOAs) in some areas are the contaminants of concern in groundwater. Groundwater samples will be collected from five monitoring wells twice for one year to determine current concentrations of these contaminants since the removal of plating line-derived waste materials.

Background/Problem Statement

American Plating, a metal electroplating company, formerly located on the Thea Foss Waterway in Tacoma, Washington (Figure 1), ceased operation in 1986 when it was discovered that facility operations potentially violated state dangerous waste regulations. Ecology conducted several site inspections from 1980 to 1985, which had determined that discharges, leaks, and spills had occurred at the site. The site had been occupied by plating companies since 1955. All companies performed metal electroplating including brass, cadmium, chromium, copper, nickel, and zinc. A preliminary site assessment conducted by EPA in 1986 concluded that high levels of plating waste and contaminated materials were present on the site. Removal of waste material and site cleanup began in June 1987. A series of site investigations, which included the installation of 12 monitoring wells, were conducted from 1988 to 1994. In 1997, the site was ranked as a "2" under the Washington Ranking Method and placed on Ecology's Hazardous Site List.

An interim action was initiated by Ecology in the summer of 2003 with the primary objective of reducing the human health risk from contact with contaminated soil. Reduction of potential risk to aquatic organisms via the groundwater-to-surface water pathway was not considered to be a

major goal of the interim action. The interim action included the removal of site buildings along with a concrete pad, sumps, and an underground storage tank. Soil was also excavated and removed from the site from depths of three to eight feet or to the water table. Clean fill and top soil were added to the excavated areas. It is anticipated that additional soil cleanup will be performed by the new site owner under the provisions of a Prospective Purchaser Consent Decree.

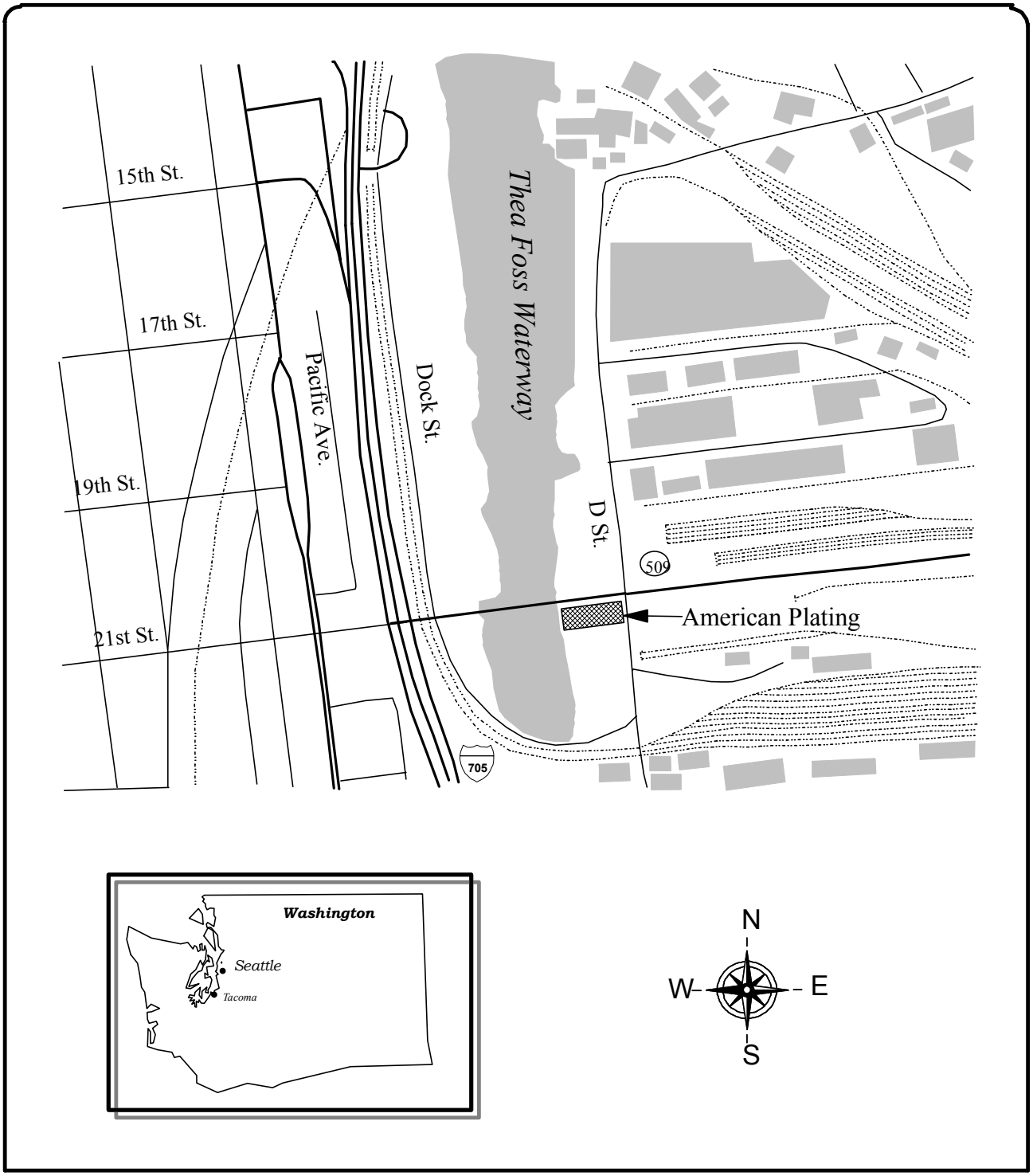

Figure 1: American Plating Site Location

Contaminants of concern in groundwater include cadmium, chromium, copper, nickel, cyanide, and volatile organics, specifically vinyl chloride. Table 1 summarizes groundwater results from 1994 along with groundwater cleanup levels. The groundwater cleanup levels were developed based on protection of human contact with surface water (MTCA Method B surface water levels) and on protection of marine organisms (WAC 173-201A). The surface water criterion for cyanide (1 ug/L for acute exposure) is based on the weak acid dissociable (WAD) cyanide.

Table 1. Comparison of 1994 Groundwater Results to Surface-Water Based Cleanup Levels

Parameter	Number of Samples	Minimum (ug/L)	Maximum (ug/L)	Mean (ug/L)	Groundwater Cleanup Level (ug/L)
Dissolved Metals					
Cadmium	12	nd	10	1.5	9.3
Chromium	12	nd	nd	--	--
Copper[a]	12	nd	3.4	--	3.1
Nickel[a]	12	nd	150	--	8.2
Cyanide	12	nd	29 (Total)	13	1 (WAD)
Vinyl Chloride	12	nd	6.1	3.5	3.7

[a] - Reporting limits for copper and nickel were often well above their respective cleanup levels.
nd – not detected

Volatile organic compounds, in particular vinyl chloride, have been detected in groundwater at the site. A 1,000-gallon degreasing tank had been located in Building 1. Chlorinated solvents stored in the tank were used to degrease parts prior to plating.

Site geology has been described in several documents (SAIC, 1994 and PRC, 1995) and is summarized as follows. Geology of the site consists of a layer of fill of variable thickness overlying 1 to 15 feet of unconsolidated silt. Beneath the silt is a deposit of sand, gravel, and silt which ranges in thickness from 5 to over 10 feet. Dense silty sand to silty gravel of unknown thickness was encountered approximately 25 to 30 feet below the surface and is interpreted to be glacial till. Groundwater primarily occurs in the upper fill and in the sand, gravel, and silt unit under unconfined and semiconfined conditions, respectively. Depth to groundwater ranges from approximately 5 to 9 feet below ground surface. Variations in groundwater elevations reflect tidal phases in both aquifers. Groundwater flow is interpreted to be in a general northwesterly direction towards the Thea Foss Waterway.

Project Description

The primary goal of this project is to provide the Toxic Cleanup Program (TCP) with post-interim action groundwater monitoring data for dissolved metals (cadmium, chromium, copper, and nickel), weak acid dissociable (WAD) cyanide, and volatile organics.

Tasks to meet these objectives are:

- Collect groundwater samples twice in one year for dissolved metals (cadmium, chromium, copper, and nickel) and WAD cyanide from five monitoring wells and volatile organics from one monitoring well (Figure 2).

- Prepare data summary sheets at the completion of each sampling event and a technical memorandum at the completion of all sampling summarizing significant findings.

Responsibilities

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

Name	**Duties**	**Phone**
Pam Marti	Project Lead	360-407-6768
Marv Coleman	QAPP and Report Review	360-407-6259
Dean Momohara	Analysis Supervisor	360-871-8808
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	360-871-8801

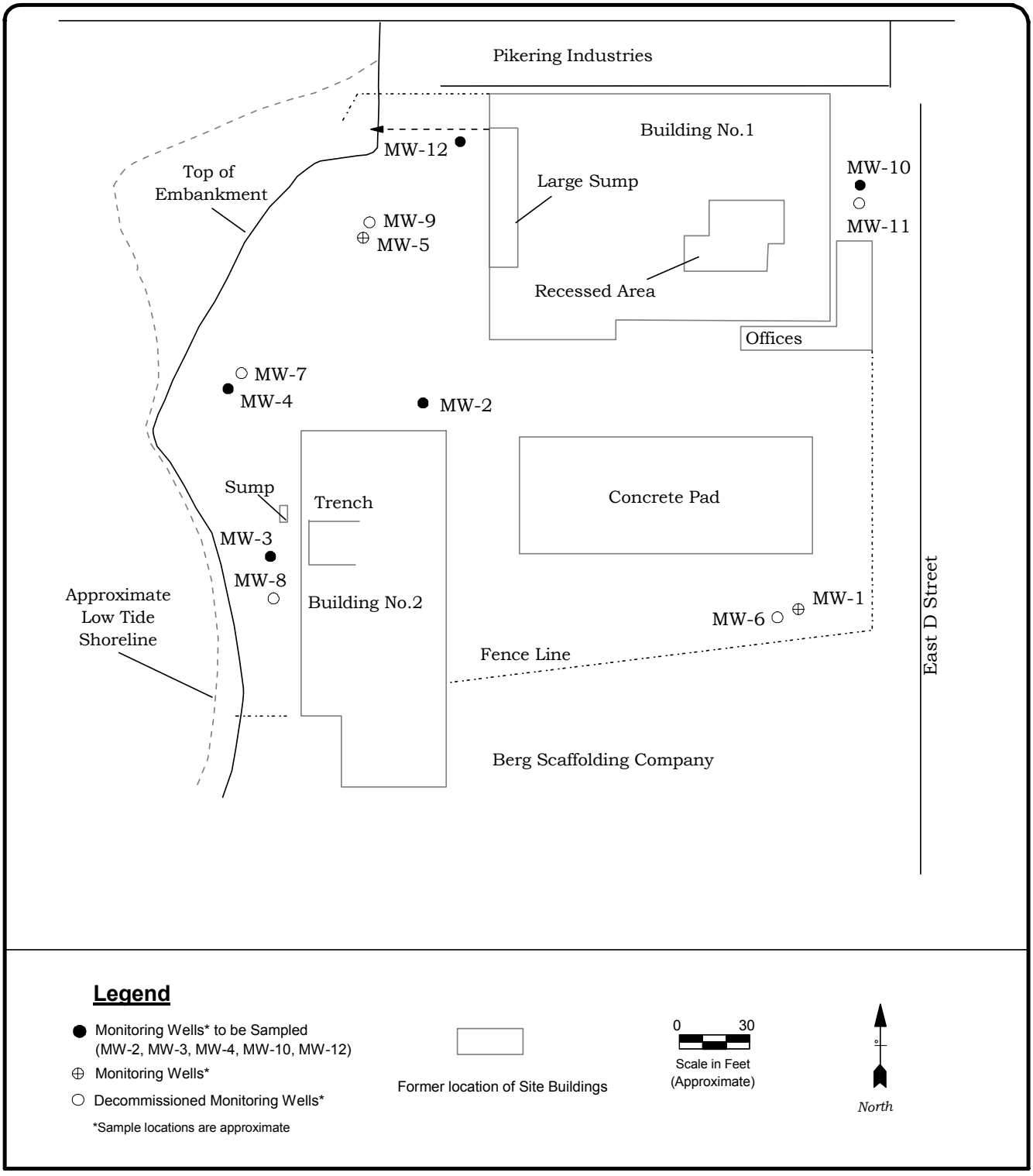

Figure 2: American Plating Sample Locations

Schedule

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

Milestone	**Date**
QAPP Approved	February 2004
Groundwater Sampling	February and August 2004
Draft Memo	October 2004
EIM Data Entry Due Date	December 2004
Final Memo	November 2004

Budget

The estimated laboratory budget for this project is $2,500, which will cover the analytical costs for the two groundwater sample collection events. The analytical costs for this project reflect the 50% discount that Ecology programs receive at Manchester Lab (i.e., actual lab costs are $5,000).

Data Quality Objectives

For this project to succeed, the bias (systematic error) and precision (random error) must be low to reveal variability in concentrations between samples. Sampling bias will be minimized by using standard procedures for sampling, preservation, transportation, and storage of the samples.

The precision and bias routinely obtained by the analysis methods for all target parameters will be adequate for this project. The measurement quality objectives (maximum acceptable values) for this project are listed in Table 2.

Table 2. Measurement Quality Objectives

Parameter	Recovery Precision for LCS	Precision for Duplicate Samples (RPD)	Matrix Spike Recoveries	Precision for Duplicate Matrix Spikes	Required Reporting Limit
Dissolved Metals	85-115%	20%	75-125%	20%	0.1-0.5 ug/L
WAD Cyanide	80-120%	20%	75-125%	20%	5 ug/L
Volatile Organics	75-125%	30%	70-130%	50%	1-5 ug/L

Goals for dissolved metals and volatile organics 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

Groundwater samples will be collected twice over the next year to determine post-interim action groundwater concentrations of dissolved metals, WAD cyanide, and volatile organics. Samples will be collected from five monitoring wells (Figure 2) and will be assumed to be representative of the groundwater quality of the site. Groundwater samples will be collected during high-tide conditions in order to be comparable to previous groundwater results.

The five wells to be sampled (MW-2, MW-3, MW-4, MW-10, and MW-12) are screened in the upper fill aquifer. The monitoring wells were completed to a depth of about 15 feet with five-foot screened intervals 5-15 feet below ground surface.

Water levels will be measured in the monitoring wells prior to sampling, using a Solinst water level meter. Measurements will be recorded to 0.01 foot and will be accurate to 0.03 foot. Well volumes will be calculated using the height of water in the well casing above the bottom of the well.

The monitoring wells will be purged and sampled using a Grundfos Redi-Flo2 stainless steel submersible pump. The pump intake will be placed at the middle of the screened interval in each monitoring well. The wells will be purged at a pump rate of 0.5 to 1-liter/minute, until field parameters (specific conductivity, pH, temperature, and turbidity) have stabilized or a minimum of three wells' 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 directly from the pump discharge line after purging. The pump will be decontaminated between each well by circulating laboratory grade detergent/water through the pump followed by a tap water rinse, each cycle lasting five minutes.

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 metal samples will be field filtered using a 0.45 micron membrane filter into a 1-liter high density polyethylene container and acidified with nitric acid to a pH <2. WAD cyanide samples will be collected in a 250- milliliter amber polyethylene bottle with sodium hydroxide preservative. 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's Operation Center in Lacey. Samples will be kept in the walk-in cooler until picked up by the laboratory courier and delivered 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 WAD cyanide and VOAs; and six-months for dissolved metals.

Laboratory Procedures

All groundwater samples will be analyzed for dissolved cadmium, chromium, copper, and nickel using EPA Method 200.8 (U.S. EPA, 1986) with a detection limit of 0.1-0.5 ug/L. WAD cyanide will be analyzed using SM4500CN-I (SM, 1998) with a detection limit of 5 ug/L. Volatile organics will be analyzed using EPA SW846 Method 8260 (U.S. EPA, 1986) with a detection limit of 1 to 5 µg/L. The detection limits obtained with these analytical methods are necessary to meet the groundwater cleanup standards for this project.

Quality Control Procedures

Field Quality Control

Field quality control will consist of collecting field duplicates. 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.

Lab Quality Control

Routine quality control procedures will be adequate to demonstrate that the MQOs for this project have been met. Laboratory quality control tests consist of method blanks, matrix spikes, as well as duplicate and check standards (lab control standards). Surrogate recoveries will also be included for the volatile organics analysis. 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. Results of quality control analyses will be reported in the same units as expressed for the MQOs. 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, Verification, 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 statisitical 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 meeting the project goals and objectives. During the project, 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.

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

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