

**ATTACHMENT A-1
QUALITY ASSURANCE PROJECT PLAN**

ATTACHMENT A-1 QUALITY ASSURANCE PROJECT PLAN

This Quality Assurance Project Plan (QAPP) provides in specific terms, the quality assurance (QA) and quality control (QC) objectives, organization, and functional activities associated with the PCB cleanup Interim Action at the WDR.

Project Organization and Responsibility

The project roles with primary QA responsibility include the Project Manager and the Project QA Manager. A list of these positions, the individuals fulfilling these project roles, and a brief description of each role is presented below:

- **Project Manager.** William Abercrombie. Overall management responsibility for the project.
- **QA Manager.** Anne Conrad. Assures that the required laboratory QC reviews/activities have been completed.
- **Overall Technical Editor Review.** Greg Both. Complete editorial review of all documents, including checks on document completeness, internal consistency, clarity and readability, and adherence to Hart Crowser report format standards.
- **Verification Laboratory Project Manager.** Harvey Jacky at Columbia Analytical Services will be the point of contact for laboratory PCB verification analyses. Valery Ivanof at Advanced Analytical will be the point of contact for laboratory TPH analysis.

Analytical Procedures

Soil samples will be screened for PCBs in the field using the PCB EnSys 12T Soil Test System (EPA Method 4020). For the areas within the ravine, once clean soil has been reached based on the results of the field screening analysis, soil verification samples will be collected and delivered to the contract laboratory for PCB analysis via EPA Method 8082. Select samples will be analyzed for Petroleum Hydrocarbons by NWTPH-Dx. Table A-1-1 and A-1-2 presents the PCB and petroleum hydrocarbon analytes, criteria, and reporting limit goals for this analysis, respectively.

Sampling Locations and Procedures

Detailed sampling procedures and locations are presented in Sections A.1.2 and A.2.2.

Sample Labeling, Custody, and Holding Times

Sample Labeling

Sample labels will clearly indicate the sample number, date, sampler's initials, parameters to be analyzed, and any pertinent comments.

Sample Custody

Sample custody procedures will be followed to provide a documented, legally defensible record that can be used to follow possession and handling of a sample from collection through analysis. A sample is considered to be "in custody" if it meets at least one of the following conditions:

- The sample is in someone's physical possession or view;
- The sample is secured to prevent tampering; or
- The sample is secured in an area restricted to authorized personnel.

A custody form will be completed in the field as each sample is collected. At a minimum, the information on the custody form shall include the sample number, date and time of sample collection, sampler, analyses, and number of containers. An example custody form is presented at the rear of this attachment. Two copies of the custody form will be placed in the cooler prior to sealing for delivery to the laboratory with the respective samples. The other copies will be retained and placed in the project files after review by the Project Chemist. Custody seals will be placed on the sample cooler to prevent tampering.

Upon receipt of samples at the laboratory, the sample custodian will sign the accompanying custody form upon opening the cooler. The sample custodian will examine samples to verify the information on the custody form. Any discrepancies, questions, or observations concerning sample integrity will be noted and Hart Crowser's Project Chemist will be contacted. The laboratory sample custodian will then log samples into the laboratory information management system (LIMS) and secure them in the appropriate storage refrigerators.

Holding Times

Sample container requirements vary according to analyte and sample matrix. Pre-cleaned sample containers will be obtained from the laboratory or a commercial vendor. The sample containers shall be cleaned following the procedure described in the Columbia Analytical Services (CAS) and Advanced Analytical (AAL) laboratory SOP.

Samples will be preserved according to the requirements of the specific analytical methods to be employed, and the samples will be extracted and analyzed within method-specified holding times. Required sample containers, preservatives, and holding times are summarized in Table A-1-2.

Quality Control Procedures

Field Quality Control Samples

Field quality control samples will include "blind" duplicate samples.

Field Duplicate Samples

Field duplicate samples are designed to monitor combined sampling and analytical precision. Field duplicates for soil are prepared by filling two identical containers with the homogenized sample.

Field duplicate sample frequency will be 5 percent. Samples will be assigned unique sample identification numbers and will not be identified to the laboratory as duplicates.

Laboratory Quality Control

The quality of analytical data generated is controlled by the frequency and type of internal quality control checks developed for analysis type. Laboratory results will be evaluated by reviewing results for analysis of method blanks, matrix spikes, duplicate samples, laboratory control samples, calibrations, performance evaluation samples, interference checks, etc., as specified in the analytical methods used. Quality control parameters, frequency, acceptance criteria, and corrective actions for laboratory analyses are discussed below.

Data Quality Indicators

The overall quality assurance objectives for field sampling and laboratory analysis are to produce data of known and appropriate quality to support the site

investigation. Appropriate procedures and quality control checks will be used so that known and acceptable levels of accuracy and precision are maintained for each data set. This section defines the objectives for accuracy and precision for measurement data. These goals are primarily expressed in terms of acceptance criteria for the quality control checks performed.

Precision

Precision measures the degree of reproducibility or agreement between independent or repeated measurements. Analytical variability will be expressed as the relative percent difference (RPD) between field or laboratory replicates and between matrix spike and matrix spike duplicate analyses. Blind field duplicate samples will be submitted to the laboratory at a frequency of five percent of the total samples. RPD will be used to measure precision for this investigation and is defined as follows:

$$RPD = \frac{(D_1 - D_2)}{(D_1 + D_2)/2} \times 100$$

Where:

D₁ = Sample value; and
D₂ = Duplicate sample value.

Accuracy

Accuracy measures the agreement between a measured value and its true or accepted value. While it is not possible to determine absolute accuracy for environmental samples, the analysis of standards and spiked samples provides an indirect assessment of accuracy.

Laboratory accuracy will be assessed as the percent recovery of matrix spikes, matrix spike duplicates, surrogate spiked compounds (for organic analyses), and laboratory control samples. Accuracy will be defined as the percentage recoverable from the true value and is defined as follows:

$$\% \text{Recovery} = \frac{(SSR - SR)}{SA} \times 100$$

Where:

SSR = spiked sample result;

SR = sample results (not applicable for surrogate recovery); and
SA = amount of spike added.

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 selected properly, 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.

Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. To ensure results are comparable, samples will be analyzed using standard EPA methods and protocols as described in Test Methods for Evaluating Solid Wastes Physical/Chemical Methods (EPA 1986). Data will also be reviewed to verify that precision and accuracy criteria have been achieved and, if not, that data have been appropriately qualified.

Completeness

Completeness is the percentage of measurements made that are judged to be valid. Completeness will be calculated separately for each analytical group. Results must also contain all quality control check analyses required to verify the precision and accuracy of results to be considered complete. Data qualified as estimated during the validation process will be considered complete. Non-valid measurements will be results that are rejected during the validation review or samples for which no analytical results were obtained. Completeness will be calculated for each analysis using the following equation:

$$\text{Completeness} = \frac{\text{valid data points obtained}}{\text{total data points planned}} \times 100$$

The target goal for completeness is a minimum of 95 percent. Completeness will be monitored on an on-going basis so that archived sample extracts can be re-analyzed, if required.

Data Reduction, Quality Review, and Reporting

This section describes the process for verifying (i.e., determining that project data were collected in a manner that meets the specified QC acceptance criteria) and validating (i.e., determining that project results are suitable for use in making the specified decision) project data.

The analytical data generated by the laboratory will undergo a QA validation by CAS and AAL with an independent review by Hart Crowser chemists. Data validation results will be documented in reports to be included as an appendix of the final design report. Data will be verified by the project QA chemist by reviewing and comparing results entered into the analytical database with validation report prior to subsequent data reduction and evaluation.

Validation and Verification Methods

A data review of data precision and accuracy will be performed on all results using quality control summary sheet results provided by the laboratory for each data package. The review will be based on CAS and AAL in-house (on-going control chart) quality control criteria following the format of the EPA National Functional Guidelines for Organic (EPA 1994) Data Review, modified to include specific criteria of individual analytical methods. The following items will be reviewed:

- Sample numbers and analyses match the chain of custody request;
- Sample preservation and holding times;
- Field and laboratory blanks were performed at the proper frequency and that no analytes were present in the blanks;
- Field and laboratory duplicates, matrix spikes, and laboratory control samples were run at the proper frequency and that control limits were met;
- Surrogate compound analyses have been performed and that results met the QC criteria; and
- Required limits of detection limits have been achieved.

Data validation qualifier flags, beyond any applied by the laboratory, will be added to sample results that fall outside the QC acceptance criteria presented in Table A-1-3. An explanation of data qualifiers to be applied during the validation review is provided below:

U. The compound was analyzed for but was not detected. The associated numerical value is the sample reporting limit.

J. The associated numerical value is an estimated quantity because quality control criteria were slightly exceeded or because reported concentrations were less than the practical quantitation limit (lowest calibration standard).

UJ. The compound was analyzed for, but not detected. The associated numerical value is an estimated reporting limit because quality control criteria were not met.

R. Data are not usable because of significant exceedance of quality control criteria. The analyte may or may not be present; resampling and/or re-analysis are necessary for verification.

Data Evaluation, Use, and Reporting

Once the field activities are complete, a report will be prepared including a summary of field observations and laboratory chemical testing results for samples submitted to the laboratory.