New York State Department of Environmental Conservation
625 Broadway • Albany, New York 12233-7011

Standby Contract for Engineering Services (No. D007618)

Generic Quality Assurance Project Plan for Work Assignments

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Plan Prepared By:

Malcolm Pirnie, Inc.

855 Route 146
Clifton Park, New York 12065
518-250-7322

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Contents

Acronyms Used in the Report

ASP	Analytical Services Protocol
CRQLs	Contract Required Quantitation Limits
DCA	Dichloroethane
DCE	Dichloroethene
FSP	Field Sampling Plan
GW	Groundwater
gpm	gallons per minute
HASP	Site Specific Health and Safety Plan
IDL	Instrument Detection Limit
MDL	Minimum Detection Limit
MPI	Malcolm Pirnie, Inc.
MS	Matrix spikes
MSD	Matrix spike duplicate
NBS	National Bureau of Standards
NYSDEC	New York State Department of Environmental Conservation
OSWER	Office of Solid Waste and Emergency Response
PARCCS	Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity
PCE	Perchloroethene (Tetrachloroethene)
RCRA	Resource Conservation and Recovery Act
PID	Photoionization Detector
PPE	Personal protective equipment
RFI	RCRA Facility Investigation
RPD	Relative percent difference
SCG	Standards, Criteria, and Guidance Values
SOPs	Standard Operating Procedures
SVOCs	Semi-volatile organic compounds
SWMU	Solid Waste Management Unit
TAGM	Technical and Administrative Guidance Memorandum
TCA	Trichloroethane
TCE	Trichloroethene
VC	Vinyl chloride
VOA	Volatile Organic Analysis
VOCs	Volatile Organic Compounds
QA	Quality Assurance
QC	Quality Control
QAPP	Quality Assurance Project Plan
EPA	United States Environmental Protection Agency

1. Purpose and Objectives

1.1. Purpose

This Generic Quality Assurance Project Plan (QAPP) has been prepared as a generic appendix to site-specific documents developed for work assignments issued under the New York State Department of Environmental Conservation (NYSDEC) Standby Contract D007618 for engineering services. The purpose of this document is to provide quality assurance/ quality control (QA/QC) methods, procedures, and protocols for the collection, analysis, and evaluation of data collected during the work assignments.

This Generic QAPP is provided as a supplement to the site-specific documents for each work assignment under the NYSDEC Standby Contract. Any deviations from, or additions to, the procedures and protocols provided in this generic QAPP are detailed in a Supplemental QAPP, which would be provided as part of each work assignment.

1.2. QAPP Objectives

The objective of this Generic QAPP is to ensure that data collected during Work Assignments investigations are of suitable quality and quantity to meet the investigation objectives. To meet this objective, the following topics are presented and discussed in this QAPP:

- Project organization and responsibilities
- Data quality objectives
- Analytical method requirements
- Data validation requirements
- Preventative maintenance
- Quality assurance procedures
- Corrective actions

Field measurement collection procedures and sample collection procedures and sample integrity are discussed in the Generic Field Activities Plan. This QAPP has been prepared to address laboratory analysis of samples and data evaluation of the laboratory sample results. In addition, this QAPP addresses components that influence these processes and provides a detailed plan to ensure that decisions being made from the analytical data are valid, accurate, and defensible in support of subsequent recommendations.

2. Project Organization and Responsibilities

2.1. Project Organization

Malcolm Pirnie will provide oversight, coordination, health and safety, field support, and evaluation of analytical data. Malcolm Pirnie will also be responsible for evaluation of analytical test results, which will be submitted to NYSDEC. Malcolm Pirnie staff members involved in the overall management of the Standby Contract and associated work assignments will be identified in the site-specific documents developed for each site.

2.2. Analytical Laboratories

Analytical laboratories subcontracted with Malcolm Pirnie will perform analysis of samples collected during the work assignments. The laboratories under subcontract will be or were selected in accordance with the provisions of the NYSDEC *Draft Handbook for Standby Consultant Contracts* (NYSDEC, 2005). All laboratories subcontracted by Malcolm Pirnie under the NYSDEC Standby Contract are approved under applicable United States Environmental Protection Agency (USEPA) and New York State Department of Health (NYSDOH) protocols. These laboratories will maintain their certification by the NYSDOH Environmental Laboratory Approval Program (ELAP).

Each laboratory has their own provisions for performing internal QA/QC review of the data prior to transmittal to Malcolm Pirnie. In addition, Malcolm Pirnie will contract a data validation service to review the methods and protocols performed by the laboratory to validate the analytical results. A summary of the data validation results will be provided in a Data Usability Summary Report (DUSR) provided by the data validation service (Section 7.2.2).

3. Data Measurement QA/QC Objectives

This section defines the QA/QC objectives for environmental sampling and analysis, including the data quality objectives (DQOs) for measurement data and the criteria for measuring performance within these objectives. Data collected during the Work Assignments may include both field measurements and analytical samples. This Section discusses the various types of data anticipated and provides QA/QC objectives for data collected during the Work Assignments.

3.1. Data Quality Objectives

DQOs are qualitative and quantitative statements that specify the quality of the data to support decisions, and are developed to address specific procedures for collecting, analyzing, and evaluating results to meet overall project objectives. DQOs are developed and implemented to ensure that the quality of the data is such that the data is legally and scientifically defensible and is applicable for its anticipated use. DQOs developed for each specific site, measurement, and media assume project objectives, data objectives, and data collection methods.

Site-specific DQOs have been developed based on the factors presented above, and are presented below. These include the specific DQOs for each planned data collection task, which identifies the particular sampling protocols, analysis methods, and laboratory deliverables to be provided for each data type anticipated.

3.1.1. DQOs for Air and Soil Vapor

The objective of the soil vapor intrusion study is to evaluate the nature and extent of contamination at concentrations exceeding the NYSDOH CEH BEEI guidance levels in ambient and indoor air and sub-slab soil vapor. To be useful in meeting this objective, the data from the air and soil vapor samples must be of known quality. To support the DQOs for air and soil vapor, NYSDOH-approved analytical methodologies with NYSDEC ASP Category B deliverables have been chosen for air and soil vapor analyses. These procedures and deliverables are capable of producing high quality data characterized by rigorous QA/QC protocols and documentation. Site-specific air and soil vapor sample analyses are summarized in each work assignment. All air and soil vapor samples will be critical samples for the evaluation of potential risks to human health and the environment.

3.1.2. DQOs for Soil and Sediment

The objective of the soil sampling program is to evaluate the nature and extent of contamination at concentrations exceeding the 6 NYCRR Subpart 375-6 Remedial

Program cleanup objectives in surface and subsurface soil. Sediment samples will be collected to evaluate the nature and extent of contaminants at concentrations greater than 6 NYCRR Subpart 375-6 Remedial Program cleanup objectives, the NYSDEC Technical Guidance for Screening Contaminated Sediments criteria, or site-specific standards. To be useful in meeting this objective, the data from the soil and sediment samples must be of known quality. To support the DQOs for soil and sediment, USEPA SW-846 analytical methodologies with NYSDEC ASP Category B deliverables have been chosen for soil and sediment analyses. These procedures and deliverables are capable of producing high quality data characterized by rigorous QA/QC protocols and documentation. Site-specific soil and sediment sample analyses are summarized in each work assignment. All soil and sediment samples will be critical samples for the evaluation of potential risks to human health and the environment.

3.1.3. DQOs for Groundwater

Groundwater will be sampled and analyzed to evaluate the nature and extent of groundwater contamination at the site. Field instrumentation will be used during sampling activities to ensure the collection of representative samples. As such, data from the field instrumentation must be of sufficient quality to measure groundwater conditions prior to sampling. Analytical data will be used to identify the location of any groundwater contamination, to aid in evaluating contaminant source locations, and to assess if any standards, criteria, and guidance values (SCGs) have been exceeded. In order to meet these objectives, the data from the groundwater samples must be of known quality. Therefore, USEPA SW-846 analytical methodologies with NYSDEC ASP Category B deliverables have been selected for all groundwater analyses. These deliverables are characterized by rigorous QA/QC protocols and documentation, which historically have provided high quality data able to meet the DQOs for this media. Site-specific groundwater sample analyses are summarized in each work assignment. All groundwater samples will be critical samples for the evaluation of potential risks to human health and the environment.

3.1.4. DQOs for Surface Water

Surface water will be sampled and analyzed to evaluate the nature and extent of surface water contamination at the site. Field instrumentation will be used during sampling activities to ensure the collection of a representative sample. Analytical data will be used to evaluate the presence of contamination and to assess if any SCGs have been exceeded. To meet these objectives, the data from the surface water samples must be of known quality. Therefore, USEPA SW-846 analytical methodologies with NYSDEC ASP Category B deliverables have been chosen for all groundwater analyses. These deliverables are characterized by rigorous QA/QC protocols and documentation, which historically have provided high quality data able to meet the DQOs for this media. Site-specific surface water sample analyses are summarized in each work assignment. The

surface water sample will be a critical sample for the evaluation of potential risks to human health and the environment.

3.2. Field Measurement Quality Assurance Objective

Tasks requiring field measurements include field screening of samples, evaluating the progress of monitoring well development, monitoring well sample collection, collection of soil conductivity data, in-situ measurements, surveying sampling locations, and field analysis of samples using test kits. To ensure the accuracy and quality of the data provided by field measurements, the Generic Field Activities Plan (FAP) provides DQOs for recording field measurements during site investigations, including the following:

- Water Quality Parameters
- Field Screening of Soil Samples
- Field Test Kits
- Data Collection Using GPS and Data Point Surveys
- Membrane Interface Probe (MIP) and Soil Conductivity Sampling
- Radiological Screening

The DQOs developed for each method will ensure that the data is appropriate and reliable for the extent they will be used in the investigation. A summary of field measurement methods, documentation, DQOs, and QA/QC protocols is provided in the Generic FAP. Specific field measurements anticipated for each data collection task are detailed in each work assignment.

3.3. Laboratory Quality Assurance Objectives

Laboratory generated data are used to accurately identify and quantify hazardous substances, while the field generated data are used in conjunction with the laboratory data for further investigation of contamination at the site. Both laboratory and field internal QC programs include steps to assure the data are reliable for the extent they will be used in the investigation. In general, laboratory QC programs are more rigorous than field QC programs.

The scope and description of QC samples and QC methods are well detailed in the applicable USEPA methodologies for the particular analyses. The methodologies for organic and inorganic analyses describe the type of QC samples and required QC methods, and the required frequency of analysis. QC limits have been established for standards, blanks, duplicates, matrix spikes, and surrogates, and are contained in the methodologies.

Laboratory QC data will be reviewed by Malcolm Pirnie personnel and by a subcontracted third-party data validation service to assess the validity of the data and determine if the DQOs have been met. This objective will be met by implementing the following:

- *Evaluation of Laboratory Method Performance* – QC criteria for method performance will be reviewed and assessed for target analyses. Analysis methods will be performed based on documented procedures by certified laboratories.
- *Sample Matrix Effects* – QC samples will be collected and analyzed to determine measurement bias due to the sample matrix. If criteria are not met, matrix interferences will be confirmed by reanalysis or inspection of laboratory control samples to verify laboratory method performance is in control.
- *Planning and Management* – Laboratories will perform preventive maintenance and routine calibration of equipment. A managed program of internal and external QC checks will be followed to ensure data quality.
- *Corrective Actions* – If QC issues are detected during QA audits or QC checks, corrective actions will be taken to stop work and modify procedures to ensure data quality.

4. Field Investigation Procedures

Field investigation procedures are provided in the Generic Field Activities Plan.

5. Calibration Procedures

Calibration procedures are provided in the Generic Field Activities Plan.

6. Analytical Procedures

All groundwater, surface water, soil, sediment, and samples collected for laboratory analysis will be analyzed by a NYSDEC ASP-certified laboratory for various analytes, including VOCs, SVOCs, pesticides/PCBs, and metals, using USEPA SW-846 analytical methodologies accompanied by NYSDEC ASP Category B deliverables. Each work assignment summarizes the analytical procedures and methods that will be utilized for the site.

The analytical methods listed in each work assignment are sufficient to support the DQOs for each project. In particular, the detection limits of these methods are adequate to support the DQOs. The general SW-846 methods and procedures used for the analysis of VOCs (Method 8260B), SVOCs (Method 8270C), pesticides/PCBs (Methods 8081A and 8082), and metals (Methods 6010B, 7470A, and 7471A) are summarized as follows:

- All instruments will have the calibrations checked at a minimum at the start of each day before measurements are made.
- The calibration and calibration checks will indicate that the sensitivity of the instrument (practical detection limit) is adequate to meet project needs and that the instrument is accurate over the working range.
- All calibration information will be recorded in the laboratory log book. This includes date and time, technician signature, calibration procedure, calibration results, calibration problems, recalibration and maintenance, and instrument serial numbers.

All air and soil vapor samples collected for laboratory analysis will be analyzed by a NYSDOH-approved laboratory for VOCs (USEPA Method TO-15) that can meet the required method detection limits determined for each work assignment.

7. Data Reduction, Validation, and Reporting

The purpose of this section is to ensure that the large amounts of data produced by the laboratory are presented in a clear and useable format. In addition, data quality and technical validity must be verified prior to data use. The samples collected at the site will be analyzed according to USEPA SW-846 analytical methodologies, in which data reduction and reporting schemes are well developed and clearly defined. The employment of this method ensures comparability with other similarly analyzed environmental samples. Reduction, validation and reporting specifications for these analyses are detailed below.

7.1. Data Reduction

Data reduction is the process by which raw analytical data generated from the analytical instrument systems is converted into useable concentrations. The raw data, which takes the form of area counts or instrument responses, is processed by the laboratory and converted into concentrations expressed in terms of milligrams per kilogram (mg/kg), milligrams per liter (mg/L), micrograms per kilogram (ug/kg), micrograms per liter (ug/L), parts per million (ppm), parts per billion (ppb), or micrograms per cubic meter (ug/m^3). These concentrations are the standard method for expressing the level of contamination present in environmental samples.

The process used to convert the instrument output into useable concentrations is clearly defined in the USEPA SW-846 methodologies. The resulting concentrations are comparable to other environmental samples in general and will be comparable to data previously collected for each site.

7.2. Data Validation

Data validation identifies invalid data and qualifies the usability of the remaining data. The output of data validation is qualitative or quantitative statements of data quality. Once the quality of individual measurements is known, a compilation of all data points into a cohesive statement can be made. The confidence associated with a statement incorporates both the confidence in individual measurements as well as in the decision.

Although rigorous validation of the data generated by the laboratory will be performed by a third party data validation subcontractor, the laboratory will be responsible for reviewing data to determine if any analytical problems exist. Specifically, the laboratory will develop a case narrative describing how closely the data meet the DQOs presented in this QAPP.

7.2.1. Data Review

The data review process shall consist of a contractual review that shall include an evaluation of the analysis and specific requirements of the published method in addition to the laboratory SOP. Data qualification shall be performed following the intent of the National Functional Guidelines in conjunction with the data validator's professional judgment, where applicable, since there are no formal validation guidelines written for this analysis.

Data will be declared invalid whenever documented evidence exists demonstrating that an sample was not collected under representative conditions, such as a air sampling canister leaking to ambient pressure during shipment.

The laboratory will provide a data reporting package. One copy of the ASP Category B data packages will be delivered to a third party data validation subcontractor for data assessment. The data packages will include the case narrative. A Data Usability Summary Report (DUSR) will be submitted to the NYSDEC. This package will include sampling analysis and summary forms.

Data validation will be performed using guidance from the following documents:

- USEPA Region 2 *Evaluation of Metals Data for the Contract Laboratory Program* (SOP# HW2 Rev. 13);
- USEPA Region 2 *Validating Semi-volatile Organic Compounds by SW-846 Method 8270* (SOP# HW22 Rev. 4);
- USEPA Region 2 *Validating Volatile Organic Compounds by SW-846 Method 8260B* (SOP# HW24 Rev. 2).
- USEPA Region 2 *Validating Polychlorinated Biphenyls by SW-846 Method 8082* (SOP# HW23B Rev. 1).
- USEPA Region 2 *Validating Volatile Organic Analysis of Ambient Air in canister by Method TO-15* (SOP# HW31 Rev. 4).

The QA/QC Task Leader will coordinate the validation of the data set based on information from the field team and information supplied from the laboratory on the analysis. The Validator shall review the submitted data package to determine compliance with those portions of the this QAPP and site documents that pertain to the production of laboratory data. Compliance is defined by the following criteria:

1. The data package is complete.
2. The data has been produced and reported in a manner consistent with the data requirements of the QAPP and the laboratory subcontract.
3. All protocol required QA/QC criteria have been met.

4. All instrument tune and calibration requirements have been met for the time frame during which the analyses were completed.
5. All protocol required initial and continuing calibration data is present and documented.
6. All data reporting forms are complete for all samples submitted. This will include all sample dilution/concentration factors and all pre-measurement sample cleanup procedures.
7. All problems encountered during the analytical process have been reported in the case narrative along with any and all actions taken by the laboratory to correct these problems.

The data validation task requires that the Data Validator conduct a detailed comparison of the reported data with the raw data submitted as part of the supporting documentation package.

Data are never declared invalid solely because they are unlikely to occur in nature, but may be flagged as suspect and be subjected to further review until the cause for the apparent anomaly is determined. The results from all QA/QC checks are evaluated to determine if the DQOs for each measurement are being met. Evidence of overwhelming measurement bias, external influences on the representativeness of the data, or lack of reproducibility of the measurement data may be cause for the data to be judged invalid.

7.2.2. Data Usability Summary Report (DUSR)

The Data Validator shall submit a DUSR covering the results of the data review process. This report shall include the following:

- A general assessment of the data package.
- Detailed descriptions of any and all deviations from the required protocols. (These descriptions must include references to the portions of the protocols involved in the alleged deviations).
- Any and all failures in the Validator's attempt to reconcile the reported data with the raw data from which it was derived. (Again, specific references must be included). Telephone logs should be included in the validation report.
- A detailed assessment by the Validator of the degree to which the data has been comprised by any deviations from protocol, QA/QC breakdowns, lack of analytical control, etc., that occurred during the analytical process.
- The report shall include, as an attachment, a copy of the laboratory's case narrative including the NYSDEC required sample and analysis summary sheets.
- The report shall include an overall appraisal of the data package.

The validation report shall include a chart presented in a spreadsheet format, consisting of site name, sample numbers, data submitted to laboratory, year of analytical protocol used,

matrix, fractions analyzed, e.g., volatiles, semi-volatiles, metals, cyanide, PCBs. Space should be provided for a reference to the NYSDEC ASP when non-compliance is involved and a column for an explanation of such violation.

7.3. Reconciliation with Data Quality Objectives

Calculations and determinations for data precision, accuracy and completeness will be performed in accordance with the procedures presented in Section 7.4 upon the receipt of the validated analytical data. Results will be compared to the project specifications discussed in the work assignment and site documents. If the results do not meet the project specifications, the data will be flagged as questionable and the cause of the failure (i.e., analytical methods, equipment failure, or sampling error) will be evaluated. The Project Manager and Quality Assurance Officer (QAO) will be responsible for decisions regarding use of questionable data. Potential outcomes of this evaluation will include limitations on the use of the data, rejection of the data, and/or re-sampling. Any limitations on the use of the data will be detailed in site reports. Corrective action procedures are discussed further in Section 10.

7.4. Data Reporting

The laboratory will report TCL and TAL data consistent with ASP reporting requirements. The QA reporting will include the following accuracy and precision protocols as performed on the appropriate QA samples.

If any of the data quality measures indicate performance outside the desired objective, the data associated with that result are not considered useless. The burden is on the project team to determine the extent to which a quality issue affects the related data, and ultimately how the issue impacts the fitness for use of the data.

Most often a single isolated incident in which the performance objective is not met does not automatically render the data useless, but rather slightly reduces the confidence that the measurement is reliable, and indicates that increased quality control measures are needed. Any potential limitations of the data set will be identified and communicated. The project team will present all known or potential limitations on the data in the final report.

Data quality is measured by how well the data meet the QA/QC goals for the project. QC elements include precision, accuracy, representativeness, completeness, comparability, and sensitivity:

- Precision is a measure of mutual agreement among individual measurements of the same property, usually under prescribed conditions. Assessing precision measures the random error component of the data collection process. Precision is determined

by measuring the agreement among individual measurements of the same property, under similar conditions. The degree of agreement, expressed as the RPD, is calculated using the formula below.

$$RPD = \frac{(V_1 - V_2)}{\frac{(V_1 + V_2)}{2}} \times 100$$

where: V1 = value 1
V2 = value 2

Analytical precision is assessed by analyzing MS/MSD pairs and laboratory duplicate samples. Field precision is assessed by measurement of field duplicate samples. The objective for precision is to equal or exceed the precision demonstrated for similar samples and should be with the established control limits for the methods. Precision control limits and QC RPD limits are noted within the laboratory SOP.

- Accuracy is the degree of agreement of a measurement with an accepted reference or true value. Accuracy measures the bias or systematic error of the entire data collection process. Sources of these errors include the sampling process, field and laboratory contamination, sample preservation and handling, sample matrix interferences, sample preparation methods, and calibration and analytical procedures. To determine accuracy, a reference material of known concentration is analyzed or a sample which has been spiked with a known concentration is reanalyzed. Accuracy is expressed as a percent recovery and is calculated using the following formula:
- Completeness is calculated as follows:

$$\%\,Completeness = 100 \times \frac{V}{n}$$

where: V = number of measurements judged valid
n = total number of measurements

The objective is to generate a sufficient database with which to make informed decisions. To help meet the completeness objective, every effort must be made to avoid sample loss through accidents or inadvertence. The completeness goal for this project is 100%.

- Comparability expresses the confidence with which one data set can be compared to another. Comparability shall be performed as described in Section 1.5.2.
- Sensitivity is the capability of a method or instrument to discriminate between small differences in analyte concentration.

8. Preventative Maintenance

The purpose of the preventative maintenance program is to ensure that the sampling, field testing, and analytical equipment perform properly thereby avoiding erroneous results, and minimizing equipment downtime. The preventative maintenance program also provides for the documentation of all maintenance to be used as evidence of instrument maintenance and for scheduling of future maintenance. This section describes the equipment maintenance program for field instruments and those responsible for implementation of the program at the Site. The specific field equipment maintenance procedures are given in the manufacturer specifications and operating manuals provided in the Generic Field Activities Plan. The laboratory preventative maintenance program is the responsibility of the laboratory and only the minimum requirements are mentioned here.

8.1. Responsibilities

Responsibilities of key project personnel are described below:

Personnel	Responsibilities
Field Team Leader	■ Keeping all maintenance records. ■ Development and implementation of maintenance program.
Equipment Manager	■ Maintaining storage of equipment within the Malcolm Pirnie equipment inventory. ■ Carrying out all maintenance according to schedule. Informing field team members of specific maintenance requirements. ■ Keeping records of all maintenance performed under his care. Sending out equipment for service/repair. Maintaining adequate supply of spare parts.
Field Personnel	■ Maintenance of all equipment located on-site on a regular basis and after each use. Keeping supply of spare parts on-hand.

8.2. Preventative Maintenance Program

The preventative maintenance program consists of three parts, normal upkeep, service and repair, and formal recordkeeping. Normal upkeep consists of daily procedures that include cleaning, lubrication and checking the batteries of the equipment. The following is a partial list of normal upkeep procedures and a partial list of important spare parts:

- Normal upkeep for environmental monitoring equipment performed daily or after each use:
  - Cleaning.
  - Lubrication of moving parts.
  - Check/charge battery.
  - Inspect for damage.
  - Check for operation problems.
  - Inspect all hoses and lines.
- Partial list of important spare parts for environmental monitoring instruments frequently used:
  - Fuses.
  - Mini Rae-UV lamp.
  - Spare battery.

The normal upkeep is performed daily after each use and includes inspecting for damage, signs of problems, and charging the batteries if necessary. Specific equipment upkeep procedures are described in the manufacturer specifications and operation manuals for each instrument provided in the Generic Field Activities Plan.

Minor service and repair will be performed by the Equipment Manager who is experienced in the service and repair of field instruments. Equipment in need of major or more complex repair and service will be sent to the manufacturer.

All maintenance, servicing and repair of equipment shall be recorded and kept on file. Field personnel shall record maintenance and instrument problems in the field instrument log books. These will ultimately be kept on file by the Field Team Leader. The Equipment Manager shall keep a record of all equipment released to the field and a record of all maintenance and service on file.

8.3. Laboratory Instrument Maintenance

Preventative maintenance procedures will be clearly defined and written for each measurement system. Maintenance activity, preventative or repair, will be documented

on standard forms, which are maintained in log books. Written procedures will include maintenance schedules, problem identification procedures, space for describing problems and repair notes, and failure analysis protocols. Service contracts and regularly scheduled in-house maintenance will be included, along with a list of critical spare parts. Laboratory instrument maintenance and calibration and corrective action procedures are incorporated in the laboratory SOPs.

8.4. Rental Equipment

Rental equipment will be obtained only from known, reputable rental suppliers. The equipment will require a pre-receipt to verify accuracy, maintenance and upkeep of the equipment.

9. Quality Assurance Procedures

In order to monitor the quality of the analytical data generated for each work assignment, an appropriate number of QC methods will be employed for all field and laboratory measurement systems. The employment of QC methods permits the validation of the analytical methodology utilized and provides a measure of the suitability of the methodology to meet the DQOs prior to the beginning of measurement or analysis. Once the measurement and analysis has begun, the employment of QC methods permits the monitoring of the system output for quality. The QC results presented with the environmental sample data, allows the data to be assessed for quality, and a determination made on how well the data has met the DQOs.

Laboratory generated data is used to accurately identify and quantify hazardous substances, while the field generated data is used in conjunction with the laboratory data for further investigation of contamination at the site. Both laboratory and field internal QC programs include steps to assure the data are reliable for the extent they will be used in the focused investigation. In general, laboratory QC programs are more rigorous than field QC programs.

9.1. Field Quality Control

The intended data uses have been identified and the DQOs established for all field measurement activities in Sections 3 and 5 of this QAPP. Section 3 contains SOPs, which describe the use and calibration of field instruments. QC methods will be used to demonstrate that the instruments are capable of producing reliable data. The QC checks employed for field instruments are as follows:

QC METHOD	PURPOSE	FREQUENCY
Calibration Check Sample	■ Insures proper working order of instrument. ■ Measures instrument accuracy and sensitivity.	Daily
Background Sample	■ Provides measure of instrument reliability.	Daily
Duplicate Sample	■ Measures instrument precision	5 %

Trip Blanks	■ Measures potential contamination from sample transport, the environment and/or shipping.	Minimum of one per cooler of aqueous volatile samples.
Field Blanks	■ Measures potential contamination due to poor sampling device decontamination procedures	One per every 20 environmental samples per media.

The calibration check samples will be analyzed daily and duplicate samples will be analyzed at a minimum frequency of five percent. The calibration check verifies that the instrument is capable of accurately identifying and quantifying contaminants of concern. The duplicates provide a quantitative measurement of the precision of the instrument. Background samples are similar to blanks and provide information regarding instrument reliability. The information is recorded in field logbooks. The field technician uses the results from these QC methods to monitor the instrument at the time of the analysis. If QC results indicate a problem with the instrument, corrective action will be taken and, if necessary, the samples will be reanalyzed. Because field measurements are generally easy to repeat, measurements should be repeated as necessary so the data are as complete as possible. The QC results are used as an indication of data quality and reliability when the data are being reviewed.

9.2. Laboratory Quality Control

The scope and description of QC samples and QC methods are well detailed in the applicable USEPA SW-846 methodologies for the particular analysis. The methodologies for organic and inorganic analyses describe the type of QC samples and required QC methods, and the required frequency of analysis. QC limits have been established for standards, blanks, duplicates, matrix spikes, and surrogates, and are contained in the methodologies. QC data will be reviewed by Malcolm Pirnie personnel to assess the validity of the data and determine if the DQOs have been met.

10. Corrective Actions

10.1. Non-conformance Reports

Corrective action will be undertaken when a non-conforming condition is identified. A non-conforming condition occurs when QA objectives for precision, accuracy, completeness, representativeness or comparability are not met, or when procedural practices or other conditions are not acceptable.

A non-conformance report will be prepared by the site QAO, approved by the Project Officer, and issued to the Project Manager and other appropriate parties. The non-conformance report will describe the unacceptable condition and the nature of corrective measures recommended and will include a discussion of specific data involved, the impact to data quality, and ultimate data usability. A schedule for compliance will also be provided.

10.2. Corrective Actions

The non-conformance report will be transmitted to a responsible officer of the ASP laboratory, the NYSDEC, the Project Officer and the Project Manager. The non-conformance report will specify, in writing, the corrective action recommended including measures to prevent a recurrence of the original deficiency. Appropriate documentation of corrective action will also be prepared. The site QAO will monitor implementation of the corrective action, and provide written record as to whether the original problem has been resolved.

10.3. Stop Work Orders

A Stop-Work Order may be issued, upon authorization, by the site QAO, if corrective action does not adequately address a problem or if no resolution can be reached. To issue a Stop-Work Order, written authorization is required from the Project Manager and the NYSDEC Representative. If disagreement occurs among these individuals, it will be brought before successively higher levels of management until the issue is resolved.

10.3.1. Stop Work Order Documentation

The conditions and need for a Stop-Work Order will be documented in sufficient detail to permit evaluation of the deficiency and determination of proper corrective action. Pertinent communications will be attached to the Stop-Work Order and referenced in the appropriate spaces. Such communications include discussions, correspondences, or telephone conversations that pertain to evaluation of the problem and potential solutions, and implementation of the preferred solution.

10.3.2. Resumption of Work

In order for work to resume following a Stop-Work Order, the Project Manager and the NYSDEC Representative must rescind it in writing.

10.4. Course and Action to Prevent Recurrence

The site QAO is responsible for tracking non-conforming conditions, evaluating the effectiveness of corrective measures, and assuring that the necessary steps have been taken to prevent recurrence of the original problem.

10.5. Field Changes

The Project Manager is responsible for all site activities. In this capacity the Project Manager will at times be required to modify site programs in response to changing site conditions. At such times the responsible Field Team Leader will notify the Project Manager of the anticipated change, and obtain the approval of the Project Manager and implement the necessary changes. The Project Manager will notify in writing the site QAO, the Project Officer, and the NYSDEC Representative. A copy of the notification will be attached to the file copy of the affected document. If an unapproved action has been taken during a period of deviation, the action will be evaluated to determine the significance of any departure from established procedures.

11. Quality Assurance Reports

Malcolm Pirnie field staff will promptly report any difficulties to the Project Manager. The laboratory will provide a written description on any quality assurance, problems to Malcolm Pirnie with submission of the analytical data packages.

Following any quality assurance audits, the site QAO will submit a Quality Assurance report to the Project Manager describing the performance of the quality assurance program. Problems or issues that arise independent of audits, may be identified to project management at any time.

12. References

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