

## REGION 4 QAPP REVIEW CHECKLIST

QAPP Title: SS QAPP Addendum 0 – Revision 1:

Willow Branch Apartments, Clarkston, GA

Project Location: 822 N. Indian Creek Drive

Originating Organization: Decide DeKalb Development Authority

Grant Number: 4B02D38522

SSQAPP Preparer: Tameka Gordon

SSQAPP Date: February 13, 2026

Transmittal Date: February 13, 2026

Revised Date: April 30, 2026

Project Number: HN257429, Task 2

| <b>USEPA - REGION 4<br/>QUALITY ASSURANCE PROJECT PLAN REVIEW CHECKLIST</b>                                                         |                 |
|-------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| P=Present & Acceptable; NP=Not Present; I=Incomplete; NA=Not Applicable                                                             |                 |
| <b>ELEMENT</b>                                                                                                                      | <b>COMMENTS</b> |
| <b>A1. Title and Approval Sheet</b>                                                                                                 | I               |
| Title                                                                                                                               | I               |
| Organization's Name                                                                                                                 | I               |
| Dated Signature of Project Manager                                                                                                  | I               |
| Dated Signature of Quality Assurance Officer                                                                                        | I               |
| <b>A2. Table of Contents</b>                                                                                                        | i-ii            |
| <b>A3. Distribution List</b>                                                                                                        | 1               |
| <b>A4. Project/Task Organization</b>                                                                                                | 2-3             |
| Identifies key project personnel, with their roles and                                                                              | 2-3             |
| Responsibilities well defined (includes end data users, project QA manager, subcontractors, etc).                                   | 2-3             |
| <b>A5. Problem Definition/Background</b>                                                                                            | 4-5             |
| Clearly states problems or decision to be made                                                                                      | 4-5             |
| Provides historical and background information                                                                                      | 4-5             |
| <b>A6. Project/Task Description</b>                                                                                                 | 5-7             |
| Lists measurements to be made includes on-site field analysis and off-site fixed laboratory analysis                                | 5-7             |
| Cites applicable technical, regulatory, or program-specific standards, criteria, or objectives                                      | 5-7             |
| Identifies types of personnel, equipment and instruments required to perform field sampling, field analysis and laboratory analysis | 5-7             |
| Provides work schedule and data deliverable timelines                                                                               | 5-7             |
| Summarizes required project and QA records/reports                                                                                  | 5-7             |
| <b>A7. Objectives and Criteria for Measurement Data</b>                                                                             | 7-10            |
| State project objectives - quantitatively and qualitatively                                                                         | 7-10            |
| Links measurement quality objectives to applicable action limits, criteria, etc.                                                    | 7-10            |

| USEPA - REGION 4<br>QUALITY ASSURANCE PROJECT PLAN REVIEW CHECKLIST                                                                                                  |       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| P=Present & Acceptable; NP=Not Present; I=Incomplete; NA=Not Applicable                                                                                              |       |
| <b>A8. Special Training Requirements/Certified Listed</b>                                                                                                            | 10-11 |
| States how training is provided, documented and assured                                                                                                              | 10-11 |
| <b>A9. Documentation and Records</b>                                                                                                                                 | 11-12 |
| Lists information and records to be included in data report (e.g., raw data, field logs, results of QC checks, problems encountered)                                 | 11-12 |
| Specifies the turnaround time for laboratory data deliverables                                                                                                       | 11-12 |
| Specifies the retention time and location for project records and reports                                                                                            | 11-12 |
| <b>B1. Sampling Process Design (Rational for Design)</b>                                                                                                             | 13-14 |
| Specified the type, number and matrix of samples slated for collection                                                                                               | 13-14 |
| Discusses the rationale for the proposed sampling design                                                                                                             | 13-14 |
| Specifies sample locations and frequency of sample collection at each location                                                                                       | 13-14 |
| <b>B2. Sampling Methods Requirements</b>                                                                                                                             | 14-16 |
| Describes sample collection procedures and methods                                                                                                                   | 14-16 |
| Lists equipment needs                                                                                                                                                | 14-16 |
| Identifies support facilities                                                                                                                                        | 14-16 |
| Identifies individuals responsible for corrective actions in the field                                                                                               | 14-16 |
| Describes the process for preparation and decontamination of sampling equipment                                                                                      | 14-16 |
| Describes selection and preparation of sample containers – and specifies sample volumes                                                                              | 14-16 |
| Describes sample container, volume, preservation and holding time requirements per each chemical, physical or biological parameter                                   | 14-16 |
| <b>B3. Sample Handling and Custody Requirements</b>                                                                                                                  | 16    |
| Summarizes sample handling requirements                                                                                                                              | 16    |
| Summarizes chain-of-custody procedures                                                                                                                               | 16    |
| <b>B4. Analytical Methods Requirements</b>                                                                                                                           | 16-17 |
| Identifies the analytical methods to be followed (including method number – and sample preparation method such as digestion/extraction method where applicable)      | 16-17 |
| <b>B5. Quality Control Requirements</b>                                                                                                                              | 17-18 |
| Identifies QC procedures and frequency for each sampling event, analysis, or measurement technique, as well as associated acceptance criteria and corrective actions | 17-18 |
| References procedures and provides equations for                                                                                                                     | 17-18 |



| USEPA - REGION 4<br>QUALITY ASSURANCE PROJECT PLAN REVIEW CHECKLIST                                                                                                                                                        |       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| P=Present & Acceptable; NP=Not Present; I=Incomplete; NA=Not Applicable                                                                                                                                                    |       |
| calculating QC statistics including bias/accuracy, precision - specifies acceptance criteria for completeness, comparability and representativeness                                                                        | 17-18 |
| <b>B6. Instrument/Equipment Testing, Inspection and Maintenance Requirements</b>                                                                                                                                           | 18    |
| Identifies acceptance testing of sampling and measurement systems                                                                                                                                                          | 18    |
| Describes equipment preventive and corrective maintenance                                                                                                                                                                  | 18    |
| Summarizes availability and location of spare parts                                                                                                                                                                        | 18    |
| <b>B7. Instrument Calibration and Frequency</b>                                                                                                                                                                            | 18-19 |
| Identifies equipment needing calibration and frequency for such calibration                                                                                                                                                | 18-19 |
| Summarizes required calibration standards, gases and/or equipment                                                                                                                                                          | 18-19 |
| Cites calibration records and the manner traceable to equipment                                                                                                                                                            | 18-19 |
| <b>B8. Inspection/Acceptance Requirements for Supplies and Consumables</b>                                                                                                                                                 | 19    |
| Provides a list of the supplies and consumables including pH buffers, conductivity and turbidity standards, etc.                                                                                                           | 19    |
| States acceptance criteria for supplies and consumables                                                                                                                                                                    | 19    |
| Identifies the individuals responsible for inspecting supplies and consumables to ensure compliance with requirements                                                                                                      | 19    |
| <b>B9. Data Acquisition Requirements for Non-Direct Measurements</b>                                                                                                                                                       | 19    |
| Identifies type of data needed from non-measurement sources (e.g., computer databases, literature searches, models, etc.) and provides the acceptance criteria for using this information                                  | 19    |
| Describes the limitations of this information and specifies when and when it cannot be used                                                                                                                                | 19    |
| Documents the rationale for original collection of data and its relevance to the project                                                                                                                                   | 19    |
| <b>B10. Data Management</b>                                                                                                                                                                                                | 20    |
| Describes record/data keeping, storage and retrieval policies/requirements for organization/project                                                                                                                        | 20    |
| Provides attachments to the QAPP containing SOPs, Checklists, Analytical Methodologies, etc.                                                                                                                               | 20    |
| Describes data handling equipment and procedures used to process, compile and analyze data (e.g., computer hardware and software) – identifies the type of software used such as Excel, Statistical, Data Validation, etc. | 20    |

| <b>USEPA - REGION 4<br/>QUALITY ASSURANCE PROJECT PLAN REVIEW CHECKLIST</b>                                                                                                                                                                                                                                                                     |       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| P=Present & Acceptable; NP=Not Present; I=Incomplete; NA=Not Applicable                                                                                                                                                                                                                                                                         |       |
| Describes the process for assuring that applicable Office of Information Resource requirements are satisfied.                                                                                                                                                                                                                                   | 20    |
| <b>C1. Assessments and Response Actions</b>                                                                                                                                                                                                                                                                                                     | 20-21 |
| Lists the required number, frequency and type of assessments or audits complete with dates and names of auditors/personnel conducting these assessments (assessments can include management system reviews, technical systems reviews, peer reviews, surveillance, performance evaluation audits, laboratory audits, data quality audits, etc.) | 20-21 |
| Describes the process for planning audits and assessments and identifies the individuals that participate in this planning                                                                                                                                                                                                                      | 20-21 |
| Identifies those individuals responsible for performing audits and assessments                                                                                                                                                                                                                                                                  | 20-21 |
| Specifies the auditors independence, authority and competence in performing audits/assessments                                                                                                                                                                                                                                                  | 20-21 |
| Specifies how audit findings are documented, verified and communicated to project personnel, senior management and EPA                                                                                                                                                                                                                          | 20-21 |
| Identifies individual(s) responsible for implementing corrective actions                                                                                                                                                                                                                                                                        | 20-21 |
| <b>C2. Reports to Management</b>                                                                                                                                                                                                                                                                                                                | 21    |
| Identifies the frequency and distribution of reports for:                                                                                                                                                                                                                                                                                       | 21    |
| Project Status Reports                                                                                                                                                                                                                                                                                                                          | 21    |
| Results of Performance Evaluations and Audits                                                                                                                                                                                                                                                                                                   | 21    |
| Results of periodic data quality assessments                                                                                                                                                                                                                                                                                                    | 21    |
| Results of quality assurance problems                                                                                                                                                                                                                                                                                                           | 21    |
| Identifies those individuals responsible for preparing reports and those that will receive these items                                                                                                                                                                                                                                          | 21    |
| <b>D1. Data Review, Validation and Verification</b>                                                                                                                                                                                                                                                                                             | 22    |
| Specifies criteria for accepting, rejecting or qualifying data                                                                                                                                                                                                                                                                                  | 22    |
| Provides a list of data qualifier flags and provides definition of each flag                                                                                                                                                                                                                                                                    | 22    |
| Provides project-specific statistics, calculations or algorithms                                                                                                                                                                                                                                                                                | 22    |
| <b>D2. Validation and Verification Methods</b>                                                                                                                                                                                                                                                                                                  | 22-23 |
| Describes or provides the data validation and verification process (can provide validation SOPs)                                                                                                                                                                                                                                                | 22-23 |
| Describe resolution procedures for data quality problems and identifies individuals responsible for resolving data quality issues                                                                                                                                                                                                               | 22-23 |
| Describes the procedures for documenting the results of data                                                                                                                                                                                                                                                                                    | 22-23 |

| USEPA - REGION 4<br>QUALITY ASSURANCE PROJECT PLAN REVIEW CHECKLIST                                                                                |       |
|----------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| P=Present & Acceptable; NP=Not Present; I=Incomplete; NA=Not Applicable                                                                            |       |
| validation, review and verification                                                                                                                |       |
| Describes the process for communicating data validation results to project personnel                                                               | 22-23 |
| <b>D3. Reconciliation of Data to Project Objectives</b>                                                                                            | 23    |
| Describes the process for reconciling project results with the project-specific data quality objectives and identifies the limitations of the data | 23    |
| Specifies the usability of the data and verifies that it meets project objectives                                                                  | 23    |
| Identifies the individuals who are responsible for reconciling the data to the project data quality objectives                                     | 23    |

**Final QAPP Disposition:**

- ☐ *Approved, no comments*  
☐ *Approved, with comments, Address Comments, Submit Revised QAPP to EPA PO*  
☐ *Conditionally Approved, Address Comments, Submit Revised QAPP to EPA PO*  
☐ *Not Approved, Address Comments, Submit Revised QAPP to EPA PO*

**References**

1. EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5, EPA/240/B-01/002 (March 2001).
2. EPA Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4, EPA/240/B-06/001 (February 2006).

Both documents can be accessed at the following website: [www.epa.gov/quality](http://www.epa.gov/quality) - Select guidance from the menu options to the left of the screen.

April 21, 2026

Project: Willow Branch Apartments – ACM Abatement

EPA Cooperative Agreement: 4B02D38522

SSQAPP Revision: Revision 1 (February 13, 2026)

**EPA Comment – Response Table**

| <b>EPA Comment</b>                                                     | <b>Response Summary</b>                                                                             | <b>SSQAPP Section</b>         | <b>Page(s)</b> | <b>Status</b>       |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-------------------------------|----------------|---------------------|
| 1. Move QAM position to show independence                              | Added narrative explicitly stating QAM independence and stop-work authority separate from PM chain. | A-4 Project/Task Organization | 2              | Resolved            |
| 2. Add EPA approval requirement if additional asbestos sampling occurs | Committed to preparation and EPA approval of an SSQAPP addendum prior to scope changes.             | A-6 Project/Task Description  | 6              | Resolved            |
| 3. Clarify project decision if additional ACM discovered               | Expanded Project Decision to include EPA notification and addendum approval logic.                  | A-7 Project Decision          | 8              | Resolved            |
| 4. Identify laboratory in text                                         | Eurofins Atlanta identified and appendices referenced.                                              | A-8 Training & Certifications | 11             | Previously Resolved |
| 5. Add SOP links and confirm appendix consistency                      | Added SOP table with hyperlinks and appendix references.                                            | B-1 Sampling Process Design   | 13             | Previously Resolved |
| 6. Clarify consistency between B-2 and B-4 methods                     | Clarified distinction between field sampling methods and laboratory analytical methods.             | B-2 Intro Text                | 14             | Previously Resolved |
| 7. Clarify contractor SOP usage                                        | Established Terracon SOPs as governing with subcontractor equivalency requirement.                  | B-3 Sample Handling           | 16             | Resolved            |
| 8. Identify accredited laboratory in B-4                               | Eurofins Atlanta explicitly named and Appendix D referenced.                                        | B-4 Analytical Methods        | 16–17          | Previously Resolved |
| 9. Attach asbestos contractor license and fix Appendix F               | Inserted reference in A-8 and included GA asbestos abatement license for Hibernia Environmental.    | A-8 / Appendix F              | 11 / App F     | Resolved            |



## A-1: Title and Approval Sheet

# Site Specific Quality Assurance Project Plan

Revision 1

**Asbestos-Containing Materials Abatement  
Willow Branch Apartments  
822 N Indian Creek Drive  
Clarkston, DeKalb County, Georgia 30021**

**April 30, 2026 | Terracon Project Number: HN257429**

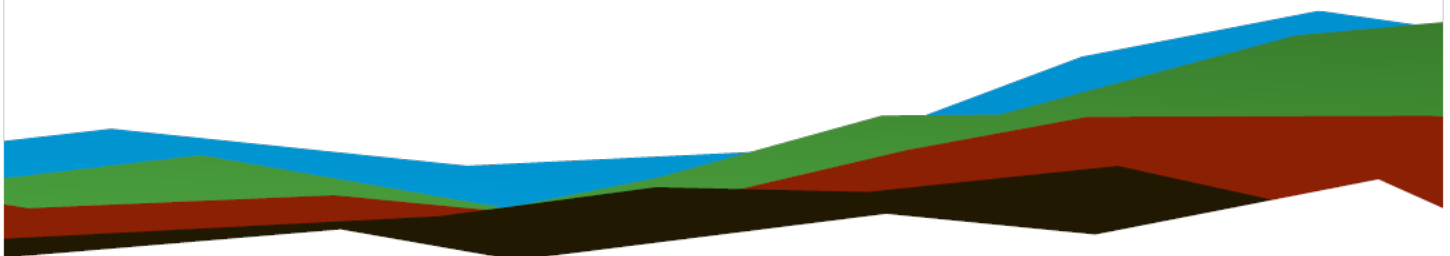
**EPA Brownfields Cooperative Agreement 4B02D38522  
ACRES Property ID: 268921**

**Prepared for:**

Housing Development Corporation of DeKalb  
750 Commerce Drive, Suite 110  
Decatur, DeKalb County, Georgia

**Prepared By:**

Terracon Consultants  
Macon, Georgia



The Site-Specific Quality Assurance Project Plan reported herein was funded wholly or in part through a cooperative agreement between the Environmental Protection Agency's (EPA's) Brownfield and Land Revitalization Program and Decide DeKalb Development Authority's Brownfield Revolving Loan Fund Program (EPA Cooperative Agreement No. 4B02D38522) through a loan provided to the Housing Development Corporation of DeKalb.

**SITE-SPECIFIC QUALITY ASSURANCE PROJECT PLAN**  
**EPA Cooperative Agreement No. 4B02D38522**  
**Date: February 13, 2026**  
**Revised April 30, 2026**  
**Revision 1**

**Asbestos-Containing Materials Abatement**  
**Willow Branch Apartments**  
**822 N Indian Creek Drive**  
**Clarkston, Georgia 30021**  
**ACRES Property ID: 268921**  
**Terracon Project No. HN257429 Task 2**

Approval:

**DECIDE DEKALB DEVELOPMENT AUTHORITY / PROJECT MANAGER:**

*Tiffany Wills* 5/6/2026 Tiffany Wills  
(Signature) (Date)

**CERM CONTRACT/ PROJECT MANAGER:**

*Darryl Edler, Jr.* 5/6/2026 Darryl Edler, Jr.  
(Signature) (Date)

**TERRACON CONTRACT/ PROJECT MANAGER:**

*Tameka Gordon* April 30, 2026 Tameka Gordon  
(Signature) (Date)

**TERRACON QA/QC REVIEWER:**

*Zack L. Dial* April 30, 2026 Zack L. Dial  
(Signature) (Date)

**HOUSING DEVELOPMENT CORP. OF DEKALB PROJECT MANAGER:**

*Tim Johnson* 05/05/2026 Tim Johnson  
(Signature) (Date)

**USEPA REGION 4 DESIGNATED APPROVING OFFICIAL (DAO):**

**PEPA** Digitally signed by  
(Signature) **SASSIN** PEPA SASSIN  
Date: 2026.05.06  
14:24:19 -04'00'

## A-2: Table of Contents

|                                                                    |    |
|--------------------------------------------------------------------|----|
| A-1: Title and Approval Sheet .....                                | I  |
| A-2: Table of Contents .....                                       | i  |
| A-3: DISTRIBUTION LIST .....                                       | 1  |
| A-4: PROJECT/TASK ORGANIZATION .....                               | 2  |
| A-5: PROBLEM DEFINITION/BACKGROUND .....                           | 4  |
| A-6: Project/Task Description .....                                | 5  |
| A-7: Quality Objective and Criteria For Measurement Data .....     | 7  |
| 1. Purpose/Background.....                                         | 7  |
| 2. Specifying Objectives.....                                      | 7  |
| 3. Project Decision .....                                          | 8  |
| A-8: Special Training Requirements and Certifications.....         | 10 |
| A-9: Documentation and Records .....                               | 11 |
| A-9.1 Field Records .....                                          | 11 |
| A-9.2 Laboratory Records .....                                     | 12 |
| A-9.3 Data Reporting Package Format and Control .....              | 12 |
| Data Management .....                                              | 12 |
| B-1: Sampling Process Design.....                                  | 13 |
| B-1.1 Field-Generated Data.....                                    | 14 |
| B-1.2 Sampling Materials .....                                     | 14 |
| B-2: Sampling Methods Requirements.....                            | 14 |
| B-2.1 Sampling Methods of Bulk Samples .....                       | 15 |
| B-2.2 Sampling Methods for Breathing Zone Air Samples .....        | 15 |
| B-2.3 Sampling Methods for Ambient Air and Clearance Samples ..... | 15 |
| B-2.4 Health and Safety .....                                      | 16 |

|                                                                                    |    |
|------------------------------------------------------------------------------------|----|
| B-3: Sample Handling and Custody Requirements .....                                | 16 |
| B-4: Analytical Methods and Requirements .....                                     | 16 |
| B-5: Field Quality Control Requirements.....                                       | 17 |
| B-6: Instrument/Equipment Testing, Inspection and Maintenance<br>Requirements..... | 18 |
| B-7: Field Equipment Calibration and Frequency.....                                | 18 |
| B-8: Inspection/Acceptance of Supplies and Consumables .....                       | 19 |
| B-9: Data Acquisition Requirements for Non-Direct Measurements .....               | 19 |
| B-10: Data Management .....                                                        | 20 |
| C-1: Assessments and Response Actions .....                                        | 20 |
| C-2: Reports to Management .....                                                   | 21 |
| D-1: Data Review, Validation and Verification.....                                 | 22 |
| D-2: Validation and Verification Methods .....                                     | 22 |
| D-3: Reconciliation of Data to Project Objectives .....                            | 23 |
| References .....                                                                   | 24 |

## Appendices

### Appendix A: Exhibits

- Exhibit 1 – Topographic Map
- Exhibit 2 – Site Diagram

### Appendix B: Terracon Standard Operating Procedures

### Appendix C: Terracon Corporate Quality Program Manual

### Appendix D: Analytical Laboratory Documents

### Appendix E: Example Field Forms

### Appendix F: Contractor’s License

### Appendix G: Health and Safety Plan

### Appendix H: Project Specifications



## A-3: DISTRIBUTION LIST

The personnel listed below will receive one electric copy of the Site-Specific Quality Assurance Project Plan (SSQAPP) and all subsequent reports:

### **United States Environmental Protection Agency, Region 4**

Sid Patel, EPA Project Officer  
61 Forsyth Street SW  
Atlanta, Georgia 30303  
[Patel.siddhartha@epa.gov](mailto:Patel.siddhartha@epa.gov)

### **Decide DeKalb Development Authority**

Tiffany Wills, Vice President, Redevelopment & Strategic Initiatives  
One West Court Square, Suite 460  
Decatur, Georgia 30030  
[twills@decidedakalb.com](mailto:twills@decidedakalb.com)

### **Corporate Environmental Risk Management**

Darryl Edler, Jr., Environmental Project Manager II  
2800 Century Parkway, Suite 750  
Atlanta, Georgia 30345  
[dedler@cerm.com](mailto:dedler@cerm.com)

### **Housing Development Corporation of DeKalb**

Tim Johnson, Brownfield Program Director  
124 S. Columbia Drive  
Decatur, Georgia 30030  
[Tim.johnson@thehdc.org](mailto:Tim.johnson@thehdc.org)

### **Hibernia Environmental**

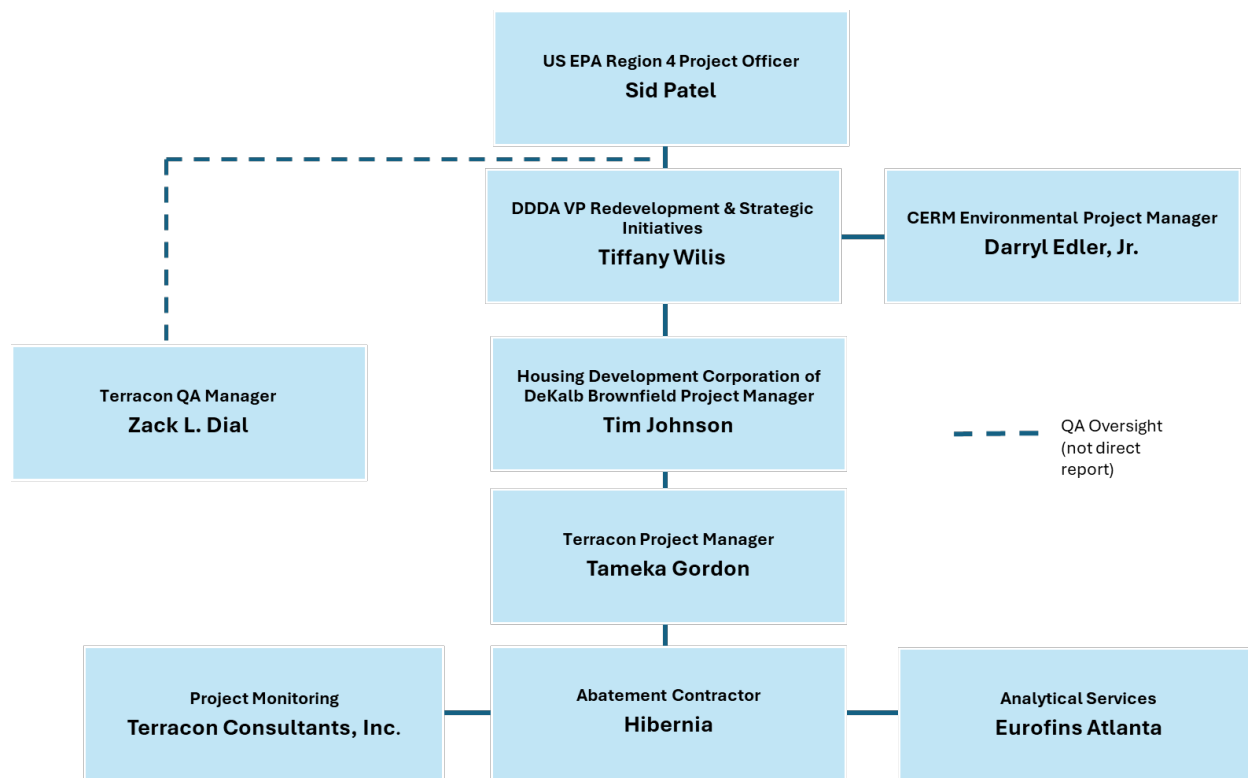
Robert Heavey, Owner/President  
3680 Hewatt Court SW  
Snellville, Georgia 30039  
[hiberniaga@comcast.net](mailto:hiberniaga@comcast.net)

### **Central Project File of Record – Terracon**

Project File PHN257429  
Tameka Gordon, Project Manager  
514 Hillcrest Industrial Blvd  
Macon, Georgia 31204  
Phone: (478) 757-1606  
[Tameka.gordon@terracon.com](mailto:Tameka.gordon@terracon.com)

## A-4: PROJECT/TASK ORGANIZATION

The *project organizational chart* below illustrates the project team for the removal of ACM at the site.



The Contractor Quality Assurance Manager (QAM) functions independently of day-to-day project execution and is organizationally separate from the Contractor Project Manager for quality decision-making purposes. The QAM does not have performance or schedule reporting obligations related to project delivery and has direct authority to identify quality deficiencies, halt work, and elevate quality concerns directly to senior Terracon management and the client, independent of project management staff. This independence ensures unbiased oversight of data quality and compliance with this SSQAPP.

Key personnel for this project and their responsibilities are as follows:

| Title                       | Name        | Entity              | Responsibilities                                                                     |
|-----------------------------|-------------|---------------------|--------------------------------------------------------------------------------------|
| Project Officer             | Sid Patel   | EPA Region 4        | Oversee and monitor the grant. Ensures tasks described in the work plan are followed |
| Brownfields Project Manager | Tim Johnson | Housing Development | General project oversight and management; contracting, project performance, and      |

| Title                                                                 | Name                             | Entity                       | Responsibilities                                                                                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------|----------------------------------|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                       |                                  | Corporation of DeKalb        | review/approval of SSQAPP; contractor oversight including review, evaluation and decision-making regarding the Contractor's recommendations. Stop work authority.                                                                                                                                                             |
| Contractor Project Manager                                            | Tameka Gordon                    | Terracon Consultants, Inc.   | Coordination of the project; ensure that project objectives are met in a safe and timely manner. Has stop work authority.                                                                                                                                                                                                     |
| Contractor Quality Assurance Manager                                  | Zack L. Dial                     | Terracon Consultants, Inc.   | Ensure the SSQAPP is followed, and quality criteria is met. Has stop work authority for quality control reasons.                                                                                                                                                                                                              |
| Lender                                                                | Tiffany Wills                    | DDDA                         | Lender of the Brownfield Revolving Loan Fund                                                                                                                                                                                                                                                                                  |
| Qualified Environmental Professional (QEP) for Lender Project Manager | Darryl Edler                     | CERM                         | Procured by Decide DeKalb Development Authority, periodic oversight and reporting to EPA                                                                                                                                                                                                                                      |
| <b>Contractor Personnel</b>                                           |                                  |                              |                                                                                                                                                                                                                                                                                                                               |
| General Contractor                                                    | Ross Haynes, CEO                 | Community Construction Group | Oversee daily onsite operations, intermediary between the client, subcontractors, and vendors                                                                                                                                                                                                                                 |
| Abatement Contractor Managers                                         | Robert Heavey and Jhonton Fornos | Hibernia Environmental       | Supervise the abatement team to perform asbestos, lead, and universal waste removal activities in accordance with applicable federal, state and local regulations and specifications. Responsible for submitting appropriate forms and submitting a summary report to the Terracon at the completion of abatement activities. |
| Project Monitoring                                                    | Todd Peterman                    | Terracon Consultants, Inc.   | Air monitoring during the asbestos abatement in accordance with GAEPD, EPA and OSHA regulations; ensure that health and safety measures are implemented during field work; and oversee the Abatement/Lead Contractor Manager to ensure field sampling procedures and protocols are followed.                                  |
| Lab Project Manager                                                   | Ioana Pacurar                    | Eurofins Atlanta             | Laboratory analytical procedures and reporting; laboratory quality control                                                                                                                                                                                                                                                    |

## A-5: PROBLEM DEFINITION/BACKGROUND

The site is located at 822 North Indian Creek Drive in Clarkston, DeKalb County, Georgia and is comprised of one tax parcel (Parcel No. 18 067 01 026). The site encompasses approximately 13.7 acres and consists of 14, two-story buildings housing 186 residential units and one office/community building and a laundry room. The buildings were constructed in 1971. According to tax records, the site has been owned by Willow Investment Partners, LLC since 2013. The location of the site is depicted on Exhibit 1 of Appendix A, which was reproduced from a portion of the USGS 7.5-minute series topographic map. The site vicinity and site layout are depicted on Exhibit 2 of Appendix A.

### Asbestos Containing Materials

A *Hazardous Materials Inspection* of the site was conducted by Terracon, and a report was issued on November 12, 2024, that identified asbestos containing materials associated with the 15 buildings located on the site. This hazardous substance qualifies for remediation/abatement/corrective action under the BRLF Cooperate Agreement between EPA and Decide Dekalb Development Authority.

The Hazardous Materials Inspection provided by Terracon included an asbestos survey where asbestos samples collected were analyzed using Polarized Light Microscopy (PLM) by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited laboratory. The asbestos survey identified asbestos in black mastic under carpet from concrete flooring (main office), black sink undercoat, textured ceiling, wallboard and joint compound (WB/JC), brown/black exterior door caulk, popcorn ceiling, exterior black and pink door caulk, and exterior black and pink window caulk.

The report recommended that the asbestos-containing materials (ACM) to be disturbed during renovation or demolition activities be abated by a State licensed asbestos abatement

The following table provides a summary of the ACM that were identified in the structure in the Hazardous Materials Assessment – Willow Branch Apartments report dated November 12, 2024:

| Homogeneous Area ID | Material Description                                  | Material Location                                                                  | Estimated Quantity of ACM |
|---------------------|-------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------|
| 1                   | Wallboard and Joint Compound (WB/JC)                  | Bldgs. M-5, M-17, M-20, P-12, P-9, P-15, P-5, H-28, H-14, L-4, K-16, K-3, J-1, P-6 | 658,232 SF                |
| 2                   | Textured Ceiling                                      | Bldgs. M-3, M-5, M-14, M-17, M-20, P-12, P-9, P-15, P-5, H-28, L-4, K-16, K-3, P-6 | 37,500 SF                 |
| 3                   | Window Caulk                                          | Bldg. L-1                                                                          | 836 Windows               |
| 9                   | Black Sink Undercoat                                  | Bldgs. M-3, M-17, H-28                                                             | 186 Units                 |
| 10                  | Brown/Black/Pink Exterior Door Caulk                  | Bldgs. P-12, L-1                                                                   | 372 Doors                 |
| 12                  | Popcorn Ceiling                                       | Bldgs. H-14, G-6                                                                   | 37,500 SF                 |
| 13                  | Black Mastic Under Carpet on top of Concrete Flooring | Main Office Building                                                               | 1,000 SF                  |

\*SF=Square Feet

## A-6: Project/Task Description

The Willow Branch Apartments are included in the Global City – Memorial Drive Community Revitalization Plan as part of the strategy to preserve and enhance affordable housing options within the Clarkston area. The Global City – Memorial Drive Community Revitalization Plan is an effort focused on the Clarkston area in DeKalb County, Georgia. The plan is designed to address the unique needs of this diverse community by supporting access to resources, jobs, education, affordable housing, and economic opportunities. The plan calls for investment in existing residential properties such as Willow Branch Apartments to support neighborhood stability, infrastructure improvements, and healthy living conditions. The plan highlights the importance of maintaining safe, affordable rental communities like Willow Branch to ensure continued access for the region’s significant refugee and immigrant populations. Willow Branch Apartments are seen as a crucial asset for families seeking affordable homes close to resources, educational institutions, and job opportunities. The plan promotes ongoing improvements in connectivity, public safety, and amenities affecting residents in Willow Branch as part of broader efforts to revitalize Memorial Drive and promote inclusive growth.

### Asbestos Containing Materials

This SSQAPP describes abatement activities to be conducted in Willow Branch Apartments prior to redevelopment of the site. An asbestos abatement plan, *Specifications for Removal of Asbestos Containing Materials*, September 3, 2025 (Project Specifications), has been prepared and outlines the materials to be addressed by Hibernia, the selected Abatement Contractor, the regulations which govern such work, safety requirements, and final clearance

criteria. The Project Specification was prepared by Terracon's ASHARA Accredited Asbestos Designer, Todd Peterman. Terracon's QA Manager performed the final review of the Project Specifications prior to distribution.

In general, the proposed scope of work includes:

- Notification to the Georgia EPD, completed by Hibernia, 10 days prior to the renovation as required under the National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulation regardless of whether ACM is present.
- Abatement of ACM – to be completed by Hibernia in accordance with Project Specifications.
- Air quality sampling and clearance inspection and sampling- to be completed by Terracon during abatement activities to document completeness of abatement and cleanup activities.
- Reporting of cleanup actions taken.

The sampling detailed in this document includes air quality sampling for asbestos fibers during the asbestos abatement for health and safety of workers and to ensure that asbestos fibers are not released to the environment during the abatement. For the purposes of this SSQAPP, no additional testing of suspect asbestos-containing materials (ACM) beyond those identified during the initial inspection and abatement activities is anticipated. However, if previously unidentified suspect materials are encountered during renovation activities, all work in the affected area shall be halted, and the materials shall be managed as presumed asbestos-containing material (PACM) in accordance with applicable federal and State of Georgia regulations.

Such materials will be either sampled and analyzed by an AHERA-accredited asbestos inspector or removed by a State of Georgia-licensed asbestos abatement contractor prior to disturbance, consistent with established asbestos management procedures. If previously unidentified suspect materials are encountered and evaluation, sampling, or abatement beyond the scope described in this SSQAPP is required, these activities will be considered a change in project scope. In such cases, an addendum to this SSQAPP will be prepared and submitted to EPA Region 4 for review and approval prior to implementation of the additional work. All data collected is critical for the project to ensure all ACM is removed from the buildings and ensure air quality standards are met for the health and safety of the workers and the surrounding community. Data generated during cleanup will be compared to published regulatory limits as follows:

- Breathing zone air sampling: Exposure assessment, air monitoring, and analysis of airborne concentration of asbestos fibers shall be performed in accordance with 29 CFR 1926.1101. Analysis of personal breathing air samples shall be conducted using the methods prescribed in 29CFR 1926.1101 to include NIOSH Method 7400 (PCM)

and compared to 0.1 fiber per cubic centimeter of air as an eight (8) hour time-weighted average (TWA) and 1.0 f/cc as a thirty-minute excursion limit.

- Ambient air sampling: Ambient air and perimeter air monitoring samples will be compared to project-specified action level of 0.01 f/cc by PCM or the site-specific baseline plus an action factor, as defined in the Project Specifications and/or the baseline fiber concentration.
- Air clearance sampling: Clearance samples will be compared to the regulatory standard of 70 structures per square millimeter ( $70 \text{ s/mm}^2$ ) for Transmission Electron Microscopy analysis and/or 0.01 fibers per cubic centimeter ( $0.01 \text{ f/cm}^3$ ) for Phase Contrast Microscopy analysis (40 CFR 763, Subpart E, Appendix A (AHERA) and the Project Specifications) or 0.01 fibers/cc for Phase Contrast Microscopy via NIOSH 7400 analysis.
- Bulk asbestos (if required): >1% 40 CFR 763, Subpart E (AHERA) requirements

## A-7: Quality Objective and Criteria For Measurement Data

In general, the quality objectives are to produce data for eligible properties that can be used to support future site redevelopment. This SSQAPP sets forth objectives and design criteria to address property-specific needs.

### 1. Purpose/Background

The purpose of this element is to document the quality objectives of the project and to establish performance criteria for the process of implementing EPA Brownfields funding in the collection of data. This element sets predefined objectives and decisions to clarify the process.

### 2. Specifying Objectives

The goal of this cleanup is the safe and lawful abatement and management of ACM at the site so that the site may be redeveloped. Performance measures applicable to this project include:

- Abatement and/or management and disposal of known ACM as outlined in Section 4.0 of this plan in accordance with applicable federal, state, and local regulations and the Project Specifications measured through visual clearance inspections.

- Protection of site workers through adherence of the Site-Specific HASP and applicable federal, state, and local regulations and the Project Specifications as measured by the collection and analysis of personal breathing zone air samples.
- Protection of the public through adherence of the Site-Specific HASP and federal, state, and local regulations and the Project Specifications as measured by ambient work area, perimeter and clearance air samples.
- Protection of the environment through adherence of the Site-Specific HASP and federal, state, and local regulations and the Project Specifications as measured completed waste disposal records.

### 3. Project Decision

The data collected will determine if ACM has been successfully abated in accordance with the Project Specifications.

If suspect materials not previously identified during the initial asbestos inspection or abatement activities are encountered during renovation or demolition, all work in the affected area shall cease immediately and the area shall be secured to prevent disturbance. The newly encountered materials shall be treated as presumed asbestos-containing material (PACM) until they are properly sampled and analyzed by an AHERA-accredited asbestos inspector and/or removed by a State of Georgia-licensed asbestos abatement contractor in accordance with applicable Georgia EPD and OSHA regulations, and analytical results confirm whether asbestos is present.

If analytical results confirm the presence of additional asbestos-containing materials beyond those identified in the original hazardous materials inspection, the project decision will include evaluation of whether the findings represent a material change to the approved scope of work. Where such a change is identified, Terracon will notify the client and EPA Region 4, and an SSQAPP addendum describing the revised scope, sampling approach, and data quality requirements will be prepared and submitted for EPA review and approval prior to continuing work.

#### **Criteria for Measurement Data**

When conducting this investigation, measurements will be made so that results are reflective of the medium and conditions being measured. Data Quality Indicators (DQIs) will be assessed by evaluating PARCC (Precision, Accuracy, Representativeness, Completeness, Comparability, and Sensitivity) of the data collection process.



## Precision

Precision is a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions, expressed in terms of Relative Percent Difference (RPD).

Analytical precision will be evaluated by comparing results from field duplicate samples. The duplicate samples are then included in the analytical sample set. The duplication of samples allows the analyst to determine the precision of the preparation and analytical techniques associated with the duplicate samples. Field duplication samples are used to evaluate errors associated with sample heterogeneity, sampling methodology and analytical procedures. The RPD between the duplicates is calculated and plotted according to the following formula:

$$RPD = ((\text{Spike 1} - \text{Spike 2}) / ((\text{Spike 1} + \text{Spike 2}) / 2)) * 100 \%$$

The precision goal for field duplicates is an RPD of 20%

## Accuracy

Accuracy is the degree of agreement of a measurement with an accepted reference or true value. It is a measure of the bias or systematic error of the entire data collection process.

To assess sample accuracy, field QC samples such as filed blanks, are typically incorporated into the sampling scheme. The data acquired from the analysis of blanks are useful in their ability to evaluate errors, which can be caused by cross-contamination. The occurrence of cross-contamination can result from improper handling of samples by the field and/or lab personnel, improper decontamination procedures, improper shipment and storage and on-site atmospheric contaminations. Adherence to proper field procedures is necessary so that deficiencies can be quickly documented and corrected.

## Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represents environmental conditions and parameter variations at a sampling location. Representativeness is the selection of analytical methods and sampling protocols and locations such that results are representative of the media being sampled and conditions being measured. Representativeness is a qualitative parameter most concerned with the proper design of the sampling program. The representativeness criterion is best satisfied by assuring that sampling locations are properly selected, and a sufficient number of investigative samples are collected. Representativeness is dependent upon the proper design of the sampling program and will be satisfied by ensuring that the field sampling plan is followed, and proper sampling techniques are used. Representativeness in the laboratory is ensured by using the proper analytical procedures.

## Completeness

Completeness is the amount of valid data obtained from a measurement system. Laboratory completeness is a measure of the number of valid measurements obtained from all the measurements taken in the project. Although every effort will be made to collect and analyze all of the samples specified in the Project Specification, the loss of a small number of samples, if they are not concentrated at a single sample site, will likely have a little effect on the false-negative error rate. The intent of this program is to attempt to achieve a goal of 100 percent completeness. Realizing that under normal conditions this goal may not be achievable, the completeness goal for this program is 95 percent. Completeness is the ratio of the number of valid sample results to the total number of samples analyzed with a specific analysis. Following completion of the analytical testing, the percentage completeness will be calculated by the following equation:

$$\text{Completeness} = ((\text{Valid Measurements}) / \text{Measurements Taken}) * 100 \%$$

## Comparability

Comparability of the data collection activities must consider field conditions as well as sampling and analytical techniques. Comparability is an expression of the confidence with which one data set can be compared to another. Comparability is dependent upon proper design and consistent execution of the sampling program. Analytical data will be comparable when similar analytical methods are used and documented.

## Sensitivity

Sensitivity will be expressed in terms of sample quantitation limits (SQLs) achievable by the laboratory. The objective of sensitivity is to have an SQL below the applicable regulatory guidance value. The laboratory is aware of the applicable standards and the need to meet these standards.

# A-8: Special Training Requirements and Certifications

### Asbestos Containing Materials

All project personnel and subcontractor personnel assigned to the project will have completed, at a minimum, required Occupational Health and Safety Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) training in accordance with 29 CFR

Part 1910.120. A copy of the State of Georgia asbestos abatement contractor license for Hibernia Environmental is included in Appendix F.

An Asbestos Contractor/Supervisor certified by GAEPD will supervise all ACM abatement. All personnel involved in abatement and air monitoring will hold applicable, current GAEPD asbestos certifications. All personnel entering areas with friable asbestos must wear the proper respiratory protection and have a recent passing respirator fit test and applicable physical on file with their respective company.

Eurofins Atlanta, the selected analytical laboratory, is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for Asbestos Fiber Analysis. Documentation of these accreditations are required. Refer to the Appendix D for analytical laboratory documents.

Safety training and certification, including documentation, will be maintained by the applicable contractors. Documentation that the selected consultants/contractors are currently certified as required should be requested prior to the initiation of clean-up activities.

## **A-9: Documentation and Records**

This element sets forth the types of data that will be retained in project files, as well as the proper retention and disposition of project documents.

### **A-9.1 Field Records**

The field forms used to develop a written record of assessment activities will include the following:

- Project specifications
- Daily Field Reports;
- Field Logbook;
- Air Sample Analysis Forms;
- Sample Custody Records; and,
- Daily Sign-In Log
- Copies of Waste Disposal Records

A HASP will be prepared to address site-specific hazards. The HASP will be reviewed by field personnel prior to fieldwork, indicating that they understand the plan and its requirements.

A copy of the HASP will be maintained onsite and made available to personnel during field activities. Further information regarding health and safety considerations, including special PPE requirements will be included in the HASP.

### A-9.2 Laboratory Records

Baseline and daily air samples to be analyzed by PCM will be collected by an GAEPD-accredited Contractor/Supervisor and analyzed by an NVLAP accredited laboratory within 24 hours of the close of each workday. The standard laboratory turnaround time for final clearance samples submitted to subcontract laboratory for analysis by TEM is 24 hours after receipt by the laboratory.

### A-9.3 Data Reporting Package Format and Control

Field documents will be recorded on standard paper formats using pre-printed forms, logbooks and indelible ink. Lined-through corrections with initials and the date will be made in lieu of erasures. The Field Team Leader/Remediation Plan Coordinator will retain project documents within his physical control at the end of any project field day. Pre-field, interim or post-field periods will see the project field documents delivered to the Contractor Project Manager and retained in project files, each specific to an enrolled property.

Electronic filing of data transferred to electronic platforms will be stored on network server with a nightly backup by separate means.

## Data Management

Data may be produced in two locations: onsite and at the laboratory. Data collected on-site will be recorded in field logbooks and field log sheets, which become part of the project file and data are included in the assessment report appendices. The Contractor Project Manager will submit copies of the field data worksheets, field equipment calibration logs and the field activity reports to the Contractor QA/QC Reviewer. Documents and records will be maintained in general accordance with the USEPA Region 4 Science and Ecosystem Support Division (SESD) Field Branches Quality System and Technical Procedures. A computer compatible with MS Office 365® will be used to help process, compile, and manage the data. The Contractor Project Manager maintains project records in a project-specific folder identified by a project number. Field data forms are scanned and placed in an electronic project folder, which also includes laboratory reports, and final reports.

The laboratory will manage the original raw laboratory data from this project (hard copy or electronic format). The laboratory QA Director retains and maintains laboratory records. Laboratory records will be managed in accordance with the selected laboratory's QMS Manual.

## B-1: Sampling Process Design

### Asbestos Containing Materials

This SSQAPP establishes minimum requirements for sampling, however, the specific sampling design for the asbestos abatement will be defined in the Project Specifications. The consultant will monitor air quality to ensure that asbestos fibers are not released from the abatement area, workers are protected from exposure and abatement areas are cleared. Air monitoring will be conducted in accordance with GAEPD and EPA sampling protocols, and in accordance with OSHA asbestos exposure requirements for asbestos workers. Air monitoring must be conducted and documented for the duration of the project.

### SOP Verification Table

The table below documents verification of the SOPs applicable to activities conducted under this Quality Assurance Project Plan. These SOPs establish standardized methods for field sampling, laboratory analysis, and data management and are reviewed to verify their applicability, approval status, and availability to project personnel.

| SOP / Method                                                                                                                                                                                                                                                                                                                                                    | Owner / Source                                                | Revision / Date |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-----------------|
| <b>NIOSH 7400 (PCM Air Analysis)</b><br><a href="https://www.cdc.gov/niosh/nmam/pdf/7402.pdf">https://www.cdc.gov/niosh/nmam/pdf/7402.pdf</a>                                                                                                                                                                                                                   | National Institute for Occupational Safety and Health (NIOSH) | Current         |
| <b>40 CFR 763, Subpart E, Appendix A (AHERA TEM)</b><br><a href="https://www.ecfr.gov/current/title-40/chapter-I/subchapter-R/part-763/subpart-E/appendix-A/appendix%20A%20to%20Subpart%20E%20of%20Part%20763">https://www.ecfr.gov/current/title-40/chapter-I/subchapter-R/part-763/subpart-E/appendix-A/appendix%20A%20to%20Subpart%20E%20of%20Part%20763</a> | U.S. EPA                                                      | Current         |
| <b>SESDPROC-209 - Packing, Marking, Labeling &amp; Shipping</b><br><a href="https://www.epa.gov/sites/default/files/2015-06/documents/Shipping-Environmental-and-Waste-Samples.pdf">https://www.epa.gov/sites/default/files/2015-06/documents/Shipping-Environmental-and-Waste-Samples.pdf</a>                                                                  | EPA Region 4 SEDS                                             | 05/31/2024      |

|                                                                                                                                                                                                                                                                                                                        |                   |         |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------|
| <b>SESDPROC-205 –Field Equipment Cleaning &amp; Decon</b><br><br><a href="https://www.epa.gov/sites/default/files/2016-01/documents/field_equipment_cleaning_and_decontamination205_af.r3.pdf">https://www.epa.gov/sites/default/files/2016-01/documents/field_equipment_cleaning_and_decontamination205_af.r3.pdf</a> | EPA Region 4 SEDS | Current |
| <b>Project Specifications – Asbestos Abatement, Revised December 2013</b><br><br><b>Attached in Appendix B</b>                                                                                                                                                                                                         | Terracon          | Current |

### B-1.1 Field-Generated Data

The project will involve the field generation of data. The major quality objective will be to collect representative data that reflects the site conditions before, during and after abatement activities. Data generated will focus on environmental controls and protection of workers and public health.

### B-1.2 Sampling Materials

The following sampling procedures shall be maintained during all sampling activities:

- Disposable equipment will be used to the greatest extent possible
- Non-dedicated or non-disposable sampling devices will be thoroughly decontaminated before and after each use
- Sample integrity will be maintained from the time of sample collection to receipt by the laboratory and through analysis.

## B-2: Sampling Methods Requirements

### Asbestos Containing Materials

This sampling plan describes air quality sampling during the asbestos abatement for health and safety of the workers and to ensure that asbestos fibers are not released to the environment during the abatement. The below sections describe the sampling methods to be followed, and B-4 describes the laboratory analytical methods to be followed.

## B-2.1 Sampling Methods of Bulk Samples

### Asbestos Containing Materials

The sampling detailed in this document includes air quality sampling for asbestos fibers during the asbestos abatement for health and safety of workers and to ensure that asbestos fibers are not released to the environment during the abatement. For the purposes of this SSQAPP, no additional testing of suspect asbestos-containing materials (ACM) beyond those identified during the initial inspection and abatement activities is anticipated. Refer to Section A-6 for sampling requirements.

## B-2.2 Sampling Methods for Breathing Zone Air Samples

### Asbestos Containing Materials

Breathing zone air samples collected during this project will be obtained using calibrated air sampling pumps to draw a known volume of air drawn through a 25-mm diameter cassette containing a mixed-cellulose ester filter. The cassette must be equipped with an electrically conductive 50-mm extension cowl. The sampling will be conducted at a recommended sampling rate of 0.5 to 5.0 liters per minute to draw a minimum of 25 liters and a maximum of 2,400 liters.

Samples and pumps will be attached to the worker with the cassette placed in the breathing zone using flexible tubing. Samples will be collected in representing full-shift exposure to determine the 8-hour TWA exposure in each work area as well as the short-term employee exposures representing 30-minute exposures for operations most likely to expose employees above the excursion limit in each work area.

## B-2.3 Sampling Methods for Ambient Air and Clearance Samples

Clearance acceptance will follow AHERA (40 CFR 763, Appendix A): TEM  $\leq 70$  structures/mm<sup>2</sup> or PCM  $\leq 0.01$  f/cc where allowed by the Project Specifications.

Ambient and clearance air samples collected during this project will be obtained using calibrated air sampling pumps to draw a known volume of air drawn through a 25-mm diameter cassette containing a mixed-cellulose ester filter. The cassette must be equipped with an electrically conductive 50-mm extension cowl. The sampling will be conducted at a recommended sampling rate of 0.5 to 16 liters per minute to draw a minimum of 400 liters.

Each air sampling cassette will be placed in the "breathing zone" approximately four to six feet above the floor, oriented downward at approximately 45 degrees from the horizontal, and connected to the air sampling pump via flexible tubing.



## B-2.4 Health and Safety

During abatement activities, all field personnel and subcontractors will be required to adhere to Property-Specific Health and Safety Plans so that all field activities are performed in a safe manner, including, but not limited to, use of proper Personal Protective Equipment (PPE). All personnel will be required to read and sign the Health and Safety Plan (HASP) and shall always be readily available. A daily tailgate safety meeting shall be conducted by the Abatement Contractor's Project Manager prior to each workday. A copy of the safety plan, and the daily sign-in sheets will remain on the project site for the duration of the field activities.

## B-3: Sample Handling and Custody Requirements

### Asbestos Containing Materials

After collection of each sample, the location and all relative sampling information will be entered into a field form. Each sample will have its own identification number. Sample cassettes will be placed into sealable plastic bags and clearly labeled. The sample names will follow Terracon's standard operating procedures (SOP) which conform to GAEPD's regulations. The samples and completed chain of custody forms will be transported to the selected analytical laboratory for analysis. No preservatives are required for the samples expected to be collected during cleanup activities and holding times for these samples are greater than 30 days. All sample handling, labeling, custody, and transport activities will be conducted in accordance with Terracon's approved Standard Operating Procedures included in Appendix B. Contractor-specific procedures used by subcontractors (including the abatement contractor) shall meet or exceed the requirements of these SOPs and will be reviewed and accepted by Terracon prior to implementation.

## B-4: Analytical Methods and Requirements

Samples collected during this project will be analyzed by Eurofins Atlanta. The anticipated laboratory analytical methods for each sample type include:

| Sample Type   | Analytical Method                                                        | Sample Media | Preservatives | Holding Time |
|---------------|--------------------------------------------------------------------------|--------------|---------------|--------------|
| Bulk Asbestos | Polarized Light Microscopy (PLM) with dispersion staining techniques per | Plastic bags | None          | >30 Days     |



|                           |                                                                             |                                                                                                  |      |          |
|---------------------------|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|------|----------|
|                           | EPA methodology<br>(EPA/600/R-93/1/640)                                     |                                                                                                  |      |          |
| Asbestos Fibers<br>in Air | PCM by NIOSH<br>Method 7400                                                 | 25-mm diameter<br>cassette containing<br>a MCEM Filter (0.8<br>micron pore size)                 | None | >30 Days |
| Asbestos Fibers<br>in Air | TEM by Interim<br>(40CFR Part 763<br>Appendix A to<br>Subpart E) /<br>AHERA | 25-mm diameter<br>cassette containing<br>a MCEM Filter (0.45<br>micron +5.0 micron<br>pore size) | None | >30 Days |

Refer to the Appendix D for analytical laboratory documents.

## B-5: Field Quality Control Requirements

### Asbestos Containing Materials

If required, bulk samples will be collected in accordance with the sampling protocols outlined in 40 CFR Part 763, Subpart E (AHERA) to include a minimum number of random samples of suspect materials to be collected in each homogeneous area.

In accordance with NIOSH Method 7400 a minimum of two field blanks (or 10% of the total samples, whichever is greater) is required for each set of samples collected. Field blanks are to be handled in a manner representative of actual handling of associated samples in the set. Cassettes are to be opened in the field at the same time as the other cassettes just prior to sampling. Cassettes and top covers are to be stored in a clean area.

Commercially available TEM cassettes will be prescreened to assure that they do not contain concentrations of asbestos which may interfere with the analysis of the sample. A filter blank average of less than 18 s/mm<sup>2</sup> in an area of 0.057 mm<sup>2</sup> (nominally 10 200-mesh grid openings) and a single preparation with a maximum of 53 s/ mm<sup>2</sup> for that same area is acceptable for this method.

In accordance with AHERA TEM Method, a total of three blanks to include two field blanks and one sealed batch blank is to be submitted for each set of clearance samples collected. Field blanks are to be handled in a manner representative of actual handling of associated samples in the set. Cassettes are to be opened in the field at the same time as the other cassettes just prior to sampling. Cassettes and top covers are to be stored in a clean area. Field blanks are to be taken by removing the cap for not more than 30 seconds and replacing it at the time of sampling before sampling is initiated. Batch blanks are to be submitted without opening the cassette and taken directly from the storage container.

For asbestos air monitoring, method-specific blanks (PCM per NIOSH 7400; TEM per AHERA) constitute the decision-critical field QC. The Generic QAPP's 1-per-10 duplicate requirement for chemistry does not apply to PCM/TEM air samples

## **B-6: Instrument/Equipment Testing, Inspection and Maintenance Requirements**

Testing, inspection, and maintenance of all field sampling equipment, field instrumentation, and health and safety monitoring instrumentation will be performed by Terracon personnel prior to any deployment for field activities. Testing, inspection, and maintenance will be performed in accordance with referenced TSOPs and manufacturers' recommendations. Terracon maintains an inventory of field equipment at its Macon office. In cases when equipment malfunctions, or is already in use at another project, needed equipment will be rented from a local or national vender or shipped from another Terracon office.

Field instrumentation and health and safety monitoring instrumentation will be calibrated and logged prior to obtaining measurements and verified by measurement of the calibration standard.

## **B-7: Field Equipment Calibration and Frequency**

### Asbestos Containing Materials

Data collection instruments utilized for this project may include:

- High-volume sampling pumps that can be calibrated and operated at a constant airflow up to 16 liters per minute.
- Low-volume, battery powered, body-attachable, portable personal pumps that can be calibrated to a constant airflow up to approximately 2.0 liters per minute, and a self-contained rechargeable power pack capable of sustaining the calibrated flow rate for a minimum of 10 hours. The pumps shall also be equipped with an automatic flow control unit which shall maintain a constant flow, even as filter resistance increases due to accumulation of fiber and debris on the filter surface.
- Single use standard 25 mm diameter cassette, open face, 0.8 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive extension cowl, and shrink bands for personal air sampling.

- Single use standard 25 mm diameter cassette, open face, 0.45 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive cowl, and shrink bands when conducting environmental area sampling using TEM method specified at 40 CFR 763 if required.
- A volumetric flow calibrator (primary calibrator) capable of calibration to within plus or minus 2 percent of reading over a temperature range of minus 4 to plus 140 degrees F and traceable to a NIST primary standard within 12 months.
- A polarized light microscope (PLM) calibrated daily to include a check of the polarizer and analyzer to ensure that they are at 90 degrees to each other, and centering of the condenser, the stage and objectives.

All data collection instruments will be calibrated in accordance with the manufacturer's specifications prior to use to help assure the collection of high-quality and representative data. Equipment calibrated by the manufacturer or vendor prior to shipment will be documented with a calibration certification shipped with the unit. Equipment which is field calibrated will be self-certified by the instrument user on a standard calibration checklist. The calibration checklist, whether generated by Consultant or Contractor, will be reviewed prior to generation of final reports. The Consultant Project Manager is responsible for final verification of calibration requirements and corrective action of all deficiencies.

## **B-8: Inspection/Acceptance of Supplies and Consumables**

Supplies and consumables such as air sampling cassettes and disposable PPE will be purchased new. All equipment must be inspected prior to use to ensure that the equipment is clean and in working order. Equipment that is not clean or in proper working order shall not be used.

## **B-9: Data Acquisition Requirements for Non-Direct Measurements**

All data collected by Terracon will be maintained in electronic databases. Data from the laboratory will be requested in electronic form. The electronic results will be reviewed to ensure that no errors occurred. If discrepancies are noted, the laboratory will be contacted to resolve the issues. The mechanism for preventing loss of information during data entry, reduction, and reporting, and data entry is detailed in Terracon Corporate Program Quality Manual provided in Appendix C.

## **B-10: Data Management**

Data management is described in section A-9.

## **C-1: Assessments and Response Actions**

This element describes the internal and external checks to provide that

- Elements of the SSQAPP are correctly implemented.
- The quality of the data produced by the SSQAPP is sufficient to the quality screening decision.
- Corrective actions, if needed, are done and effectiveness is confirmed by Terracon's Project Manager.

The end use of the data is commensurate with a determination of whether the site is acceptable for the proposed future use by the Housing Development Corporation of DeKalb. The end use of the data will be for comparison to established acceptance clearance criteria in the referenced state and federal regulations.

To accomplish the objectives of the purpose of the internal and external checks, the following assessment activities may be performed.

### **Field Check**

These will consist of an unannounced in-progress visit to the sites during on-property assessment to observe the activities and management of the project by GAEPD and/or EPA. The GAEPD/EPA will make no formal written deliveries, but findings and observations will be conveyed verbally to the Brownfields Project Manager, Tim Johnson.

### **Technical Methods Audit**

These will be conducted at random and unannounced as in-progress checks of requested copies of daily records from the Contractor Project Manager relative to the performance of the specific activity. This will result in written documentation of the event being delivered to the Contractor Project Manager, Tameka Gordon and/or Contractor QA Reviewer, Lem Dial. The auditor copy will remain resident in the project file.

### **Project Files/Media Check**

This will be conducted at random and unannounced as an in-progress check of resident hardcopy and electronic project files. This will result in written documentation of the event being delivered to the Contractor Project Manager, Tameka Gordon and/or QA Manager, Lem Dial. The auditor copy will remain resident in the project file.

### **Field Methods Check**

These will be conducted at random and unannounced as in-progress checks of requested copies of daily records provided by the Contractor field team captain, Todd Peterman or authorized surrogate relative to the performance of the specific activity. This will result in written documentation of the event being delivered to the Contractor Project Manager, Tameka Gordon and/ or QA Manager, Lem Dial. The auditor copy will remain resident in the project file.

### **Technical Check**

These will be conducted at random and unannounced as in-progress checks of requested copies of daily records directly from the Contractor field captain, Todd Peterman or authorized surrogate relative to the performance of the specific activity. Non-compliance will be verbally communicated immediately to the Contractor Project Manager, Tameka Gordon. This will result in written documentation of the event being delivered to the Contractor Project Manager, Tameka Gordon and/or QA Reviewer, Lem Dial. The auditor copy will remain resident in the project file.

### **Significant Deviation Notifications**

The Contractor PM will notify the CAR/QEP within 24 hours of discovery at minimum, for: (i) loss of decision-critical samples/QC minimums; (ii) holding time exceedances for decision-critical analytes; (iii) preservation/temperature excursions affecting usability; (iv) use of non-approved methods for decision-critical analytes; (v) inability to meet required RL/LOQ for decision-critical analytes. Corrective actions and notifications will be documented in the final report.

### **Laboratory Certifications and Performance Audits**

These assessments will occur on the schedules, of the content and at the discretion allowed by programs of the regulating and certifying agency as set forth in public programs. Reporting will be consistent with those programs. Any non-compliance or serious failure of the program which revokes or impugns the accreditation necessary to this Project will be immediately reported in writing to the Terracon Project Manager, Tameka Gordon.

## **C-2: Reports to Management**

Following completion of field activities, laboratory work, and internal review and data validation, the Contractor will develop a report documenting cleanup activities, associated data, findings, and assessment conclusions. Necessary deviations will be discussed accordingly. The significance of any deviations requiring corrective action will be evaluated by the Contractor Project Manager before report development. The final report will be submitted to the Housing Development Corporation of DeKalb.

Additional reports to management tasks are described in section C-1.

## **D-1: Data Review, Validation and Verification**

The Contractor Project Manager will be responsible for conducting a full-package review of the field process and data produced for the project and compared to the measurement criteria listed in Section A-7 of the SSQAPP.

The laboratory QA Officer or an appropriate designee will conduct validation and reporting consistent with the laboratory QM Plan. Data validation will include a review of the following items: chain-of-custody reporting, analytical completeness, sample volume calculations and detection limits.

The Contractor Project Manager will calculate and record failures of acceptance for replicate samples analyzed by the laboratory. Calculations will be conducted relative to project-specific criteria of DQI acceptance set forth in Section A-7. The Terracon Project Manager will discuss and evaluate failures relative to usability of the data and potential influence on project decision(s).

After validation of each laboratory package is completed, the laboratory results will be summarized in tabular form. The data summary report will include tabular summaries of analytical testing results, laboratory reports and a summary of data validation conclusions. In addition to the data summary report, data collected during the project will be summarized in the final report.

Measurements and procedures compliance will be compared to the SSQAPP with specific emphasis on performance within parameters of standard methods. The quality of the laboratory test results will be assessed through an evaluation of the results of the submitted QA/QC samples and laboratory internal QA/QC results. The laboratory data assessment procedures will consider the following items as set forth in Section A-7:

- Analytical Precision;
- Positive detections in field blank samples;
- Representativeness;
- Completeness;
- Instrument calibrations.

## **D-2: Validation and Verification Methods**

The Housing Development Corporation of DeKalb's abatement project conducted with end comparison under state-specific requirements does not require the detailed statistical and numerical comparison of traditional CERCLA or other enforcement activities.

The focus will be on the completeness and accuracy of field methods, proper sample handling and a reliance on the validation and verification of the laboratory operating within its GAEPD program certification and associated protocols. This approach, supported by the other elements of the SSQAPP discussed previously, is consistent with or exceeds current levels of industry practice for work within the state programs.

The resultant data and information produced through implementation of the SSQAPP will be reviewed on a specific basis to the DQI objectives set forth in Section A-7. The review and verification will check that the stipulated methods were implemented, and where failures occurred, assess the relative impact to the quality process.

Qualified or corrected procedures and data for the comparison to the state program standards will likely be acceptable if consistent with and sufficient to satisfy the project objectives.

### **D-3: Reconciliation of Data to Project Objectives**

A failure to validate full compliance of a field procedure will not likely remove the resultant data from use by the Housing Development Corporation of DeKalb, it may merely qualify it for recognition and use by others beyond the primary decision.

With the increased reliance on laboratory systems to produce quality data, a significant failure to validate project chemistry will be less likely to be used in the process. Laboratory data failures will be given more extensive consideration and result in a written opinion by the Contractor Project Manager as to usability relative to the DQO and by the Housing Development Corporation of DeKalb. Key to the reconciliation will be the following considerations.

- Is the invalid or qualified data point the sole determinant?
- Does inclusion of the flawed method or qualified data point/set skew the resultant conclusion?

The resultant opinion of the Terracon Project Manager will be incorporated as an element of uncertainty in the Final report to be delivered to the Housing Development Corporation of DeKalb. Limitations on the use of the data produced during the project will be included in the final report.

## References

Terracon made primary use of the following references in preparation of this document.

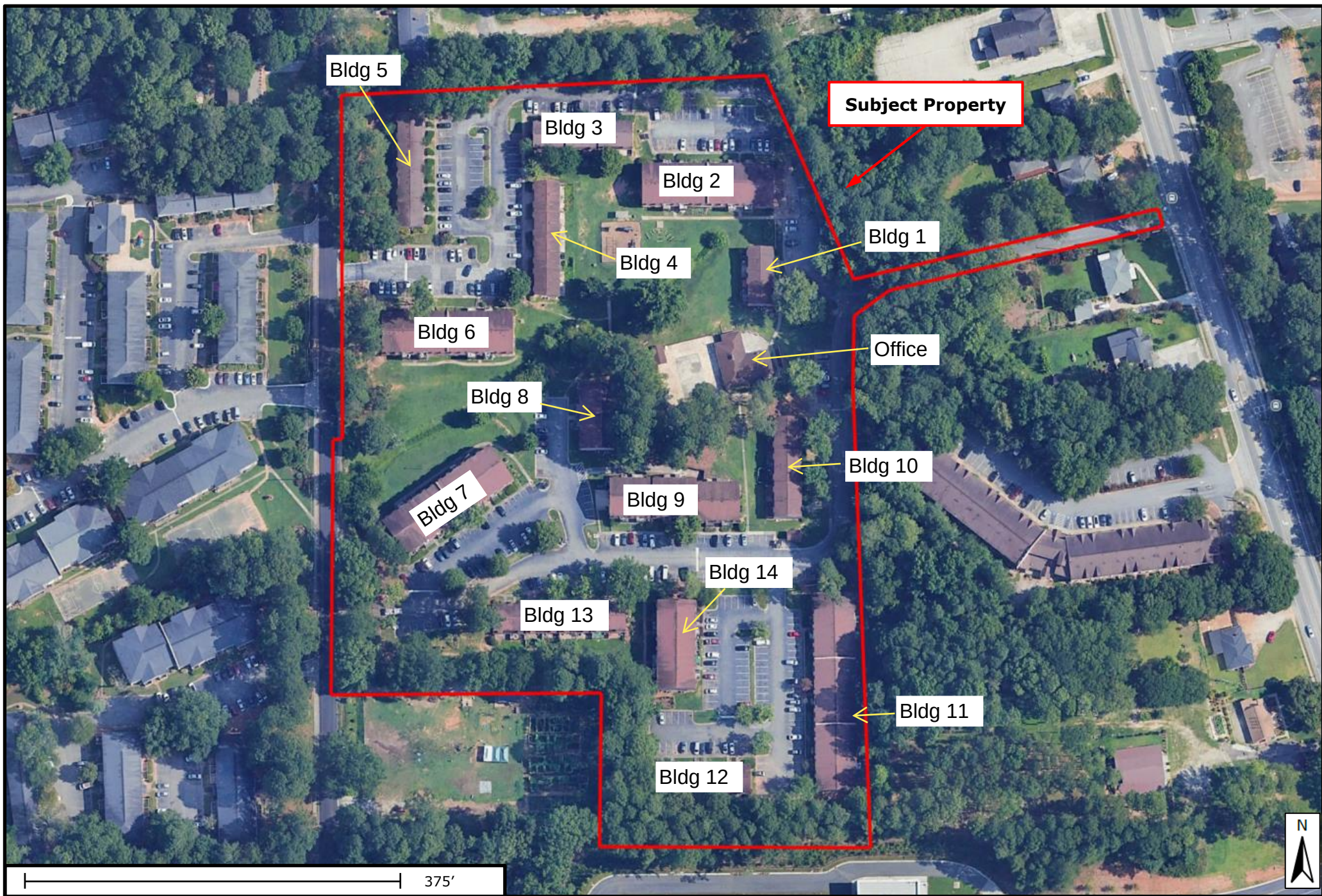
1. U.S. Environmental Protection Agency. 2006. *Guidance on Systematic Planning Using the Data Quality Objectives Process*. EPA QA/G-4 240/B-06/001. February 2006.
2. U.S. Environmental Protection Agency. 2006. *EPA Requirements for Quality Assurance Project Plans*. EPA QA/R-5. EPA 240/B-01/002. March 2001.



# **Appendix A: Exhibits**







|                  |    |             |                |
|------------------|----|-------------|----------------|
| Project Manager: | KR | Project No. | HN257429       |
| Drawn by:        | KR | Scale:      | As Shown       |
| Checked by:      | TG | File Name:  | HN257429       |
| Approved by:     | TG | Date:       | SEPTEMBER 2025 |



514 Hillcrest Industrial Boulevard  
Macon, Georgia 31204

2023 Aerial Photograph  
Willow Branch Apartments  
822 North Indian Creek Drive  
Clarkston, DeKalb County, Georgia 30021

Exhibit

2



# **Appendix B:**

# **Terracon Standard Operating**

# **Procedures**



## STANDARD OPERATING PROCEDURE for EPA Brownfield Grant Projects

### E.10 PROJECT MOBILIZATION

**Last Review / Revision:** December 2013

**Reviewer / Office:** DEK/Corporate

#### OBJECTIVE

Allow field personnel an opportunity to review the requirements and objectives for performing the necessary field tasks and discuss with the project manager concerns associated with the project, safety, and methodologies.

Key to Terracon's Incident and Injury Free culture is pre-task planning. Pre-Task Planning is the most proactive skill we can learn to create and sustain an IIF workplace and make sure all of our employees go home safely every day. It is required from the very beginning when preparing proposals and starting projects, as well as when we assign work and execute the tasks throughout the day. This includes mobilization for projects.

#### PROCEDURE

Field personnel should discuss the proposed field activities with the project manager prior to initiating the site work. This will be a formal "sit down, face-to-face" transfer of project information and objectives from the Project Manager to the designated field or task manager. All parties will engage in the planning. This should include, but not be limited to, discussions on:

#### Project Objectives

Assure that personnel have an understanding of the objectives prior to initiating the field activities. This will provide a greater insight and allow field personnel to make appropriate decisions based on site specific conditions. This briefing provides background information which allows the field personnel to think about field operations in a way which will optimize performance and data gathering efficiency.

Discuss the regulatory framework within which the report and results of field work will be used. Identify special requirements of specific regulatory programs.

#### Specific to EPA Brownfield Grant or Pilot Projects of Any Type

The mobilization Team will have in hand as part of planning mobilization copies of the following;

- Site eligibility determination approved by EPA Project Officer
- Access agreement signed by the property owner, not a tenant
- EPA-approved Quality Assurance Project Plan (QAPP)
- EPA-approved Sampling and Analysis Plan

#### Site Safety Plan (SSP)

Staff will implement IIF using the Terracon *Pre-Task Planning Quick Reference Sheet*, available [here](#) if viewing this electronically or it can be printed from the Terranet Corporate Safety Website under the IIF Toolbox section.

The team will then review the SSP with the project manager and sign the acknowledgement. Confirm that you have the proper monitoring equipment, protective clothing and respiratory device and confirm that you are aware of the monitoring requirements and safety level.

**Permits/Right of Entry (R.O.E.)/Utility Clearance**

Make sure that the proper permits, R.O.E. and utility clearance have been secured. This will avoid delays at the job-site. Determine that all parties, including the client, property owner or tenant, and regulatory official have been notified, if necessary.

**Drilling/Development/Sampling Requirements**

Review the drilling/development/sampling requirements to allow for satisfactory completion. Determine location of all borings/monitoring wells and the soil and groundwater sampling sequence for chemical analysis and definition of the stratigraphy.

**Decontamination**

Review cleaning procedures and TSOPs for the drilling equipment and/or sampling equipment. This is imperative to minimize cross-contamination and maintain safe site conditions.

**Communications**

Establish a communications link in the event that field personnel must consult with the project manager or designee in instances when the project manager cannot be reached.

**Chain-of-Custody**

Review the procedures to provide for proper Chain-of-Custody maintenance from sample collection through analysis.

**Equipment**

Confirm that the proper equipment is available, functional, cleaned, and calibrated. The project manager should provide a checklist of all equipment required, especially when the equipment needs to vary from the norm.

**DOCUMENTATION**

The project manager is responsible for providing the following documentation to the field crews prior to field activities:

- Site Safety Plan (completed)
- Mobilization Sheet
- Site Location Map
- Site Diagram
- Field manuals and references as appropriate
- Site photography, when appropriate and allowed



## STANDARD OPERATING PROCEDURE for EPA Brownfield Grant Projects

### E.20

#### STANDARD SAFE OPERATING PROCEDURES FOR HAZARDOUS WASTE OPERATIONS

Last Review or Revision: June 2010

##### I. PURPOSE

This document defines standard safe operating procedures for use on project sites where intrusive activities will be performed and where soil/groundwater contaminants are known or are reasonably expected to exist. These procedures will be incorporated in the project safety and health plan which is mandatory for intrusive activities conducted at all such project sites.

##### II. SAFETY AND HEALTH RESPONSIBILITY

- A. The Project Manager is ultimately responsible for ensuring that work on environmental investigation/remediation projects are performed in accordance with provisions outlined in the project safety and health plan. A Site Safety and Health Officer (SSO) will be designated at each project site to monitor compliance with this safety-related practices during field activities. The SSO will ensure that a copy of the safety and health plan is available on site for the duration of project activities.
- B. The Corporate Safety and Health Manager will be consulted for each intrusive environmental investigation/remediation project. The Corporate Safety and Health Manager will develop the site safety and health plan, and will be available to consult with Project Manager/SSO in the event of questions, concerns or changed site conditions. The Corporate Safety and Health Manager will specify air monitoring and personal protective equipment requirements for the project, and will assist in obtaining specialized equipment required for the project.
- C. If hazardous conditions develop during the course of project activity, the SSO in conjunction with the Terracon Corporate Safety and Health Manager, will coordinate actions required to safeguard site personnel and members of the general public. Additional safety measures will be verbally communicated to all project personnel, recorded in writing and appended to the site safety and health plan.
- D. Terracon and subcontractor task leaders will be responsible for:
  - Presenting the contents of the site safety and health plan to all subordinate site personnel.
  - Monitoring compliance with applicable provisions of the safety and health plan.

- Periodically inspecting heavy equipment and other machinery and maintaining such equipment in compliance with applicable federal, state or local safety regulations.
- Enforcement of corrective actions.

### **III. MEDICAL SURVEILLANCE**

A. All Terracon personnel participating in intrusive projects with known or reasonably anticipated contaminants must be enrolled in the Terracon Medical Surveillance Program. Each project participant will be certified by a licensed physician as fit for respirator and semi-permeable/impermeable protective equipment use. Medical clearance will be current to within one year of the project start date.

B. Certificates of medical examination for all project personnel will be maintained by the Corporate Safety and Health Manager and/or by the SSO in the project command center or support vehicle.

C. At the discretion of the Terracon consulting physician, an "exit" physical examination will be conducted at the completion of project activities or upon termination of a project participant. Follow-up medical examinations will also be provided in the event of job site injury or unprotected exposure to contaminants in excess of eight-hour time weighted average permissible exposure limits.

### **IV. TRAINING REQUIREMENTS**

A. Terracon personnel participating in hazardous waste operations will have completed 40 hour Hazardous Waste Operations Training and at least three days supervised field activity. A current 8-hour annual refresher training certificate will be required for all personnel. Training certificates for all project personnel will be maintained by the Corporate Safety and Health Manager.

B. The SSO will conduct a pre-project safety and health briefing for all project participants. The personnel responsible for project safety and health will be addressed, as will site history, scope of work, site control measures, emergency procedures and site communications. The briefing will address site contaminants, air monitoring protocols, action levels for upgrade/downgrade of personal protective equipment and level of personal protective equipment to be employed for each project task.

C. Project participants will sign the Acknowledgment of Instruction form contained in each safety and health plan following the initial site briefing.

### **V. CHEMICAL HAZARDS**

A. The Project Manager is responsible for obtaining available information regarding site contaminants, including analytical information obtained from samples previously collected at the project site, and for forwarding the information to the Corporate Safety and Health Manager for research and hazard analysis. A site specific safety and health plan will be developed notifying personnel of the



potential chemical contaminants, their health hazards, routes of entry, warning properties and symptoms of exposure.

B. Evaluation of chemical contaminants/concentrations will be used in the development of the air monitoring and personal protective equipment requirements contained in the site safety and health plan.

## VI. PHYSICAL HAZARDS

### A. Drilling Projects

- All personnel working around drill rigs will be familiarized with emergency shut-down procedures and the position of "kill" switches.
- No loose fitting clothing, jewelry or unsecured long hair is permitted near the rig.
- Keep hands and feet away from all moving parts while drilling is in progress. Shovel auger cuttings with long handled shovel. *DO NOT* use hands or feet.
- Daily inspection of all ropes, cables and moving parts is mandatory.
- A first aid kit and fire extinguisher will be immediately available at all times.
- All drill crews shall consist of at least two persons.
- No drilling is permitted during impending electrical storms, tornadoes or when rain creates a hazardous work environment.
- A minimum horizontal and vertical clearance distance of **10 feet** must be maintained between the drill rig and overhead power lines; use spotters to help rig operator position the vehicle when near overhead power lines.

### B. Excavation Project Sites

- Wherever possible, soil samples will be collected from backhoe buckets. Personnel will enter excavations only as a final option and only in accordance with the regulatory requirements outlined above.
- AT NO TIME WILL TERRACON PERSONNEL ENTER EXCAVATIONS TO COLLECT SOIL SAMPLES UNTIL A PROPER MEANS OF EGRESS/EXIT IS PROVIDED AND THE EXCAVATION HAS BEEN INSPECTED BY A COMPETENT PERSON AND APPROPRIATELY SHORED OR SLOPED IN ACCORDANCE WITH THE OSHA EXCAVATIONS STANDARD (29 CFR 1926, SUBPART P).
- Personnel will remain at least 3 feet from the sides of excavations during sample collection and excavation observation.
- Personnel will remain outside the swing radius of backhoe buckets during excavation, and will stand behind the backhoe or within line-of-sight contact with the backhoe operator at all times.

## VII. ACCIDENT PREVENTION

- The Site Safety Officer will hold daily safety briefings at the beginning of each day of site activity.
- Traffic control measures will be arranged for all projects conducted within or immediately adjacent to active roadways. Signage, warning and/or channelizing devices will conform to the Manual on Uniform Traffic Control Devices. Flagging operations will be conducted only by personnel who have received training in proper traffic flagging procedures. The preferred method of traffic control will be to contract these services to a reputable traffic control service knowledgeable in local traffic control regulations.
- Safety orange work vests will be worn by personnel working within 10 feet of any active roadway.
- The Site Safety Officer will ensure that unauthorized personnel do not enter the work zone. Authorized visitors will be briefed on site contaminants, personal protective equipment requirements and the decontamination provisions of the site safety and health plan.
- The Site Safety Officer will continually inspect the work area for infractions of safety and health requirements as contained in the site specific safety and health plan.
- The Site Safety Officer will investigate and immediately report all accidents to the Corporate Safety and Health Manager.
- Site activities will be conducted only during daylight hours unless adequate portable lighting is mobilized to the project site.
- The "buddy system" will be observed at all times during intrusive site investigations. A minimum of two people will work together and remain within eye sight or not greater than 100 ft. apart.
- Teamwork and the use of mechanical lifting devices will be employed where practical to ease lifting tasks and reduce the potential for musculoskeletal injury.

## VIII. SITE CONTROL

A. An Exclusion Zone, Contaminant Reduction Zone and a Support Zone will be established on hazardous waste operations sites requiring Level C or Level B personal protective equipment. Defined access and egress points will be established and personnel will enter only through those points.

B. As permitted by site topography, the area within a 50 foot radius of a drill rig and 100 foot radius of UST removal excavations will be considered the Exclusion Zone. Only those personnel designated by the Project Manager/SSO are allowed to enter the Exclusion Zone. Where practical, or where their use will prevent public injury, temporary signs or barricade fencing will be established to define the Exclusion Zone. ABSOLUTELY NO SMOKING WILL BE PERMITTED WITHIN

## THE EXCLUSION OR CONTAMINANT REDUCTION ZONES ON ANY PETROLEUM CONTAMINATED SITE.

C. If unauthorized personnel attempt to enter the exclusion zone, the SSO will verbally inform the individual(s) to leave the project site. If unauthorized individuals refuse to leave the Exclusion Zone or are considered in danger or pose danger to project personnel, the SSO will cease project activities (i.e., shut down drill rigs, excavation equipment, etc.) and notify the client representative or the local police of the situation.

### IX. AIR MONITORING

A. Air monitoring protocols will be designed to prevent personnel exposure to airborne contaminants in excess of established permissible exposure limits. The results of field air monitoring will be used to determine the continued adequacy of initial personal protective equipment.

B. Task Leader(s) will be knowledgeable in the operation and troubleshooting of air monitoring equipment. A manual on the operation of each air monitoring instrument and an appropriate calibration kit will be mobilized to the project site with the instrument. Air monitoring instruments will be calibrated under field conditions each day prior to use. Task Leaders are instructed to consult the operator's manual for appropriate calibration gas and calibration techniques.

### X. PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment requirements for each hazardous waste operations site and task will be specified in the site safety and health plan. Personal protective equipment selection will be based upon the site contaminants and tasks to be performed. Personal protective equipment ensembles will be selected in general accordance with standard EPA levels of protection as follows:

A. **Level A** - To be selected when the greatest level of skin, respiratory, and eye protection is required. Level A personal protective equipment ensembles will consist of:

1. Positive pressure, full face-piece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA, approved NIOSH.
2. Totally-encapsulating chemical-protective suit.
3. Coveralls.(optional, as appropriate)
4. Long underwear.(optional, as appropriate)
5. Gloves, outer, chemical-resistant.
6. Gloves, inner, chemical-resistant.
7. Boots, chemical-resistant, steel toe and shank.
8. Hard hat (under suit).(1)
9. Disposable protective suit, gloves and boots

B. **Level B** - To be selected when the highest level of respiratory protection is necessary but a lesser level of skin protection is required. Level B personal protective equipment ensembles will consist of:

1. Positive pressure, full-facepiece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA (NIOSH approved).
2. Hooded chemical-resistant clothing (coveralls and long-sleeved jacket; coveralls; one or two-piece chemical-splash suit; disposable chemical-resistant overalls).
3. Coveralls.(optional, as appropriate)
4. Gloves, outer, chemical-resistant.
5. Gloves, inner, chemical-resistant.
6. Boots, outer, chemical-resistant steel toe and shank.
7. Hard hat.

C. **Level C** - To be specified when the identity and approximate concentration of airborne contaminants is known and the criteria for using air purifying respirators are met. Level C personal protective equipment ensembles shall consist of the following:

1. Full-face (typically) air purifying respirators (NIOSH approved).
2. Chemical-resistant clothing (coveralls; two-piece chemical-splash suit; disposable chemical-resistant overalls, as appropriate).
3. Gloves, outer, chemical-resistant.
4. Gloves, inner, chemical-resistant.
5. Boots (outer), chemical-resistant steel toe and shank.
6. Disposable boot-covers, outer, chemical-resistant (optional)
7. Hard hat.(1)

D. **Level D** - A work uniform affording minimal protection. Level D or modified Level D personal protective equipment will be used when contaminant concentrations are low and not readily absorbable through the skin and where atmospheric monitoring indicates no need for respiratory protection. The following constitute Level D equipment; it may be used as appropriate:

1. Coveralls.
2. Chemical-resistant gloves.(style selected based on contaminants)
3. Boots/shoes, chemical-resistant steel toe and shank.
4. Boots, outer, chemical-resistant (disposable).
5. Safety glasses or chemical splash goggles (where appropriate).
6. Hard hat.

## **XI. DECONTAMINATION**

A. Equipment decontamination is necessary on all contaminated project sites. Personnel decontamination for projects below personal protective Level C will consist of washing off safety footwear, proper cleaning or disposal of outer and inner gloves and thorough washing of face, arms and hands. A full body shower will be required as soon as possible upon leaving the project site.

B. For projects involving personal protective equipment at Level C or above, a decontamination station will be established on the interface of the Exclusion Zone. A Contaminant Reduction Zone will be established and will extend 10 feet beyond the decontamination station.

- Two Wash Tubs
- Scrub Brush
- Plastic Bags
- Water and Alconox Detergent

The wash tub on the exclusion zone side of the site will contain a solution of water and Alconox detergent; the second wash tub will contain clean rinse water. Personnel decontamination will consist primarily of detergent washing and rinsing of reusable exterior protective gear. Coveralls will be removed by turning the clothing inside out.

Personnel may not leave the contaminant reduction zone without proceeding through the decontamination sequence described below.

- Wash work gloves, boots and poly laminated protective coveralls,
- Rinse work gloves, boots and coveralls,
- Remove tape at wrists and ankles,
- Remove protective coveralls,
- Remove respirator
- Dispose of spent cartridges; wash and rinse respirator
- Remove outer gloves
- Remove inner gloves

Expendable personal protective equipment will be placed in plastic trash bags, sealed and disposed of per client agreement. Decontamination solutions will be containerized or disposed of as arranged by Project Manager.

C. Decontamination of equipment will be performed to limit the migration of contaminants off-site. All equipment will be cleaned prior to site entry to remove grease, oil and encrusted soil. Decontamination of large equipment will consist of physically removing gross contamination with shovels, brushes etc. followed by detergent and water high pressure wash with a clean water rinse. The Project Manager is responsible for determining if decontamination solutions must be containerized. If so, a decontamination sump or polyethylene sheeting and fluid containers will be mobilized and established in the decontamination area. Decontamination of hand samplers and similar small equipment will be performed at a designated location within the Contaminant Reduction Zone. Decontamination of such equipment will consist of detergent solution wash and clean water rinse. Specialized decontamination solutions (acids, solvents, biocidal, etc.) may be specified in site specific site safety and health plans.

## **XII. SITE COMMUNICATIONS**

Communication between personnel on most hazardous waste project sites will be via verbal communication or hand signals. Visual contact between members of task teams should be possible throughout the course of project activities. Contact with the SSO will be through direct

verbal communication. The following hand signals will be used whenever verbal communication is limited:

| <u>Signal</u>                                | <u>Meaning</u>         |
|----------------------------------------------|------------------------|
| Thumbs Up                                    | OK, all is well        |
| Grab throat with both hands                  | Can't breathe          |
| Shake head, thumbs down                      | NO, negative           |
| Point right (when facing equipment operator) | Move/steer left        |
| Point left when facing equipment operator)   | Move/steer right       |
| Grab partner's wrist                         | Leave area immediately |

### **XIII. EMERGENCY RESPONSE PROCEDURES**

A. The Project Manager is responsible for obtaining and recording emergency telephone contacts in the appropriate section of the site safety and health plan prior to site mobilization: A mobile telephone will typically be available on hazardous waste operations project sites.

B. In the case of personal injury, appropriately trained personnel will be requested to provide first aid and emergency rescue. For minor injuries, such as cuts, burns, exhaustion, heat cramps, insect stings, etc., the affected employee will be removed to an uncontaminated area. The SSO or other designated employee trained in first aid procedures will administer appropriate first aid. If the injury requires additional medical attention, the injured employee will be cleaned and transported to the nearest hospital or emergency medical facility.

C. For more serious injuries the SSO or designee will summon an ambulance to the project site. No attempt will be made by Terracon personnel to move the victim, without the aid and/or instructions of qualified medical personnel.

D. If the victim cannot be safely moved without a stretcher or other specialized equipment, the victim will be removed at the earliest possible moment by appropriately attired Terracon personnel with the direction and/or assistance of qualified medical response personnel. The injured employee will be immediately decontaminated and transported to the nearest medical facility. A crew member designated by the SSO will inform the ambulance crew of contaminants of concern and provide assistance with additional decontamination if required.

### **XIV. EVACUATION AND SHUTDOWN PROCEDURES**

A. On project sites posing a significant risk of chemical or physical hazard exposure, the site safety and health plan will instruct the SSO to establish and notify site personnel of emergency "rally" points. In the event of a site emergency, personnel will immediately exit the site and assemble at the designated rally point. Evacuation routes will be dependent on site topography and wind conditions. The routes will be selected and presented by the SSO daily prior to site activity.

B. If emergency evacuation becomes necessary, the SSO will sound the emergency alarm (e.g. support vehicle horn or compressed air horn). Personnel will safely

shutdown all electrical and mechanical equipment and quickly proceed to closest designated rally point. The SSO will then account for each crew member on site.

- C. In the event that a Terracon employee does not report to the designated rally point within 5 minutes of the evacuation alarm, the SSO will perform an immediate assessment of site conditions. If site conditions do not pose an immediate hazard to life or health, the SSO will initiate search and rescue efforts utilizing two crew members attired in appropriate personal protective equipment.



### E.25 BASIC RECORDKEEPING AND FIELD DOCUMENTATION

**LAST REVIEW/REVISION:** February 2014  
**REVIEWER/OFFICE:** DEK/Corporate

#### OBJECTIVE

To provide a basic level and quality of documentation throughout Brownfield projects that complements and supports other data collection forms in the course of conducting field activities during environmental assessments, sampling, or remediation. The intent is not to place into writing an extensively detailed “diary” of every activity, but rather to log and record significant information that is useful as a measure of field activities during report writing and discussions with clients and agencies. The information should be legible and readily understood by other than the author; later being used as a reference by managers, other project staff and quality assurance reviewers.

#### PROCEDURES

Appropriate documentation will be maintained to track project activities and document quality control. The following sections describe the specific records that will be maintained through the duration of the project.

Individual TSOPs, agency- or client-approved sampling plans or other referenced guidance may prescribe specific additional documentation that staff will complete specific to field tasks. These forms will be fully completed unless otherwise approved by the Project Manager. Errors in all documents shall be deleted with one line through the erroneous text, and initialed by the author. At the start and end of work day on the site, the time shall be noted and each initialed or signed by the author.

Common and routine field documentation includes, but is not limited to the following;

#### Safety

Every environmental project should be accompanied by a formal project-specific Health and Safety Plan (HASP or HSP). The on-site copy of the HSP will be incorporated into field documentation for on-site use, reference and field notations of required safety measurements. Any pre-task planning should be included.



### Copies of Work Scope

The on-site copy of the final site-specific sampling and analysis plan will be incorporated into field documentation for reference and field notations relative to field-dictated changes in sample collection, field screening, and laboratory analysis procedures. Field copy of the sampling plans will include drawings and maps that illustrate property location, property features, and proposed sampling locations relative to these features. The rationale behind each proposed location and laboratory analysis will be provided in text and/or tables of the sampling plan for reference by field staff.

If a formal sampling and analysis plan is not required for the sampling activity or if the plan is field-derived (i.e., Triad approach), a field copy of the final proposal with scope of work will be incorporated into field documentation for reference and field notations relative to field-dictated changes in sample collection.

If a formal Quality Assurance Project Plan (QAPP) is required for the sampling activity, a field copy of the QAPP will be maintained with field documents for in-progress reference and discussions with off-site managers/supervisors during the course of field activities.

### Field Logbook

Field site managers will document activities on daily log forms. The site manager will maintain the daily log forms with a field copy of the QAPP and Property-Specific Sampling and Analysis Checklists. Between field mobilizations, the Terracon Project Manager or Field Site Manager will maintain the daily log forms in a project file that will be placed at a central file location (see Sections **Error! Reference source not found.** and **Error! Reference source not found.**) following completion of the project. The daily log forms will include documentation relative to observed site conditions, sample collection information, problems encountered, sampling plan deviations, photograph logs, and other relevant information.



### Custody Records

Field site managers will maintain a copy of completed chain-of-custody records for collected laboratory samples. The Field Site Manager will provide the Terracon Project Manager copies of the completed chain-of-custody forms following completion of field activities. The Project Manager will subsequently maintain these records at the central office file location.

### Photographic Documentation

A photographic log will be maintained to document project activities and site conditions. Photographs will be taken during each day of major field activity. Photographs will be stored electronically and as hard copies with the project file. Logs will be maintained to document photograph details such as date, direction, photographer, and photo descriptions.

In taking photographs to document site conditions, field staff should keep in mind the following general rules;

- Include objects of scale in the photographs. Preferably items of known dimension in close-up pictures (e.g., rulers, tape measures, survey rods) and common objects for wider view documentation of the property (e.g., car, street sign).
- Keep in mind how the documentation will be used and presented in the final report. If unsure, ask the Project Manager.
- To the extent practical, document the site from a distance and from different directions so that other users have a perspective of the “total” site.
- Take and document more pictures than you will need for the final report.



## STANDARD OPERATING PROCEDURE for EPA Brownfield Grant Projects

### E.30

#### CHAIN OF CUSTODY DOCUMENTATION

**Last Revision:** June 2010

##### **OBJECTIVE AND APPLICATION**

This document defines standard operating procedures for documenting sample collection using proper chain-of-custody techniques. The purpose of proper chain-of-custody techniques is to provide accountability for and documentation of sample integrity from the time samples are collected until sample disposal.

This procedure is intended to document sample possession during each stage of a sample's life cycle, that is, during collection, shipment, storage, and the process of analysis.

##### **EQUIPMENT**

- Terracon chain-of-custody record(s) or laboratory-specific chain-of-custody forms (typically supplied with sample containers),
- If samples are being shipped via courier, custody seals for coolers,
- Indelible ink marker, and
- Zip top bag.

##### **PROCEDURE**

Sample containers will be labeled in advance of sampling with the sample date, location (well identifier), sampler's initials, and project name. Written sample custody procedures will be followed whenever samples are collected, transferred, stored, analyzed, or destroyed, in order to trace possession and handling of a sample from collection to disposal. Accountability for a sample begins when the sample is collected. Each sample will be accounted for with the use of sample labels, chain-of-custody forms, a record of sample collection, and field data notebooks.

The following chain-of-custody procedures will be implemented by the field staff:

- Entries in the field notebook and chain-of-custody form will be made in ink. Documentation of each sample must be completed at the time of sampling.
- The chain-of-custody should include at a minimum:
  - Project name and/or number
  - Name and contact information for the sampler collector
  - Collector's signature
  - Sample designation

- Date sampled
- Time sampled
- Sample media
- Number and size of containers for each sample
- Types of sample preservatives used
- Analyses requested
- The original chain-of-custody must accompany the samples at all times after collection, until receipt at the analytical laboratory. A copy of the chain-of-custody form will be kept by the field staff until filing at the office.
- The original chain-of-custody form should be sealed in a Ziplock bag if shipping samples on ice via courier. The sealed Ziplock bag will protect the document from moisture that may be present due to sample preservation. The chain-of-custody should be the last item packed in a sample cooler, so that it is easily accessible if the cooler is misplaced by the courier or shipped to an incorrect address.
- If shipping samples, a chain-of-custody specific to the contents of each cooler will be packaged with the respective samples. Chain-of-custody forms should not be shipped in separate containers than the samples they document. At least one custody seal should be completed by the collector and applied to each cooler sent to the laboratory. The custody seal should be affixed to the cooler in such a manner as to ensure breakage of the seal upon opening of the cooler (e.g., across the cooler lid opening).
- When the possession of samples is transferred, the individuals relinquishing and receiving the samples will sign, date, and note the time on the chain-of-custody form.
- If samples are shipped, strict chain-of-custody is violated. However, at the discretion of the project manager the procedures can still be followed.

## ATTACHED REFERENCES

Terracon Form COC-7/92     *Chain-of-Custody Record*, revised 4/93

Quality Environmental Containers     *Custody Seal*

## OTHER SUPPORTING DOCUMENTS

ASTM D4840-99     *Standard Guide for Sampling Chain-of-Custody Procedures*



## STANDARD OPERATING PROCEDURE for EPA Brownfield Grant Projects

### **E.2240 SITE SECURITY PROCEDURES**

Last Review or Revision: June 2010

#### **Objective**

To establish procedures for the security of the subject site and remediation systems during hours when employees are not present.

#### **Equipment**

- a) Keyed-a-like locks.
- b) Site key file box.
- c) Site diagrams.
- d) Operation and Maintenance procedures.
- e) Materials specified by the Project Manager.

#### **Procedures**

##### **a) Site Security**

The Project Manager will determine the specific security requirements for each site. Coordination with the client may be necessary to provide additional keys if needed. Keyed-a-like locks should be the same throughout the entire system. A benchstock of commonly used locks is maintained for the field crews to replace broken or damaged locks. If open excavations or sensitive materials are located on-site, the Project Manager may specify the use of access control, such as fencing or barricading.

##### **b) Key Control**

Keys for each system will be maintained in the central key control box in the Terracon Office. Additional keys may be maintained by field crews and the project manager for routine access. The site keys will be contained on a tab and clearly marked with the site name, job number and location.

##### **c) Site Monitoring**

The field crew conducting field services is responsible for the security of the site. A final review must be conducted daily prior to leaving the site to check and document site security. The field crew will complete the "Daily Job Report" to indicate that the site is secure or that exceptions were encountered at the site. The project manager will then be able to schedule the necessary corrective action.

#### d) Site Documentation

Documentation must be maintained at each remediation site to assist field crews in routine operation, maintenance, and emergency activities. The following documents are to be maintained on site:

1. Site diagram of all wells associated with the site;
2. Schematic of the system including free product and water lines;
3. Electrical diagram;
4. Site Safety Plan;
5. Maintenance checklist and schedule;
6. Current settings and operational limits of the system (switch settings, and flow rates);
7. Summary of system operational characteristics (flow rates, inventory levels,
8. Operational and Maintenance manuals for all system components;

All components of the system are to be labeled for identification. This includes pump controls, flow lines, product lines, level probes, and valves.

#### e) Signs

Each site should have a sign identifying the site and indicating critical information concerning the operation of the system in the event unusual operations are encountered. This could include the client's name and phone number, or Terracon's name and phone number.

#### f) Vehicles

Secure all vehicles left on-site during non-working hours. Lock all doors and close all windows. Store the keys in the central key control box.

Following is an example of a Daily Job Report. Either this form or another similar form will be utilized to document daily on-site activities.



Job No \_\_\_\_\_

Test Date \_\_\_\_\_

**DAILY JOB REPORT**

Time on Job \_\_\_\_\_

Job Name \_\_\_\_\_

Time in Lab \_\_\_\_\_

Job Location \_\_\_\_\_

Time in Office \_\_\_\_\_

Contractor \_\_\_\_\_

Travel Time \_\_\_\_\_

Client \_\_\_\_\_

TOTAL CHARGEABLE HOURS \_\_\_\_\_

MILEAGE \_\_\_\_\_

Description of technical and/or engineering field operations including field test data\*, locations (show direction of north), elevations, and other information:

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TERRACON states that the above tests and/or field engineering services have been performed and the results are reported herein. This report, however, does not relieve the contractor of the responsibility to comply with the plans and specifications.

\*Indicate when the field test data is estimated, pending final laboratory test results.

Attested to: \_\_\_\_\_

Position: \_\_\_\_\_

Company: \_\_\_\_\_

TERRACON

By: \_\_\_\_\_



## STANDARD OPERATING PROCEDURE for EPA Brownfield Grant Projects

### **E.2405 CLEANING – GENERAL**

**LAST REVIEW OR REVISION:** June 2010

#### **OBJECTIVE AND APPLICATION**

To prepare the equipment for field activities in a manner that minimizes the potential for obtaining biased or erroneous data due to contaminant transfer. Cleaning is performed as a quality assurance measure and a safety precaution. It minimizes cross-contamination between samples and also helps to maintain a clean working environment. This procedure provides general guidelines and should be used in conjunction with more specific procedures applicable to the cleaning method used.

#### **EQUIPMENT**

- As determined by the project manager
- Expendable supplies:
  - Disposable chemical-resistant gloves
  - Garbage bags
  - Aluminum foil or plastic
  - Laboratory glassware detergent such as Alconox or Trisodium Phosphate (TSP)
  - Containers for collection of waste liquids, if necessary
  - Dilute acid, methanol, ethanol, isopropyl alcohol or other cleaning fluid
- Source of potable water without chemicals that would interfere or be identified in chemical analysis of samples. The project manager may require laboratory testing of cleaning water as a background for evaluating chemical analyses.

#### **PROCEDURES**

Cleaning procedures will vary considerably based on the equipment, type of contaminant, type of sample and detection levels. Initial cleaning should take place at the site prior to demobilizing. This will minimize the spread of contamination. The extent of on-site cleaning will vary based on specific conditions; however, an attempt should be made to decontaminate as thoroughly as possible on site. The more care one applies on keeping the equipment clean, the less energy will be required on cleaning.

All field equipment must be prepared at the laboratory/office prior to use. This will include additional cleaning, inspection, and maintenance.

Equipment such as hand trowels, bailers, mixing bowls, hand augers, etc., should be cleaned and wrapped in aluminum foil (with shiny side out) or plastic, as appropriate, prior to mobilization.

Sampling and monitoring equipment is normally cleaned by washing and rinsing with liquids such as a soap or detergent solution, potable tap water, deionized water (DI), isopropyl alcohol, methanol, or a dilute acid.

The extent and type of contaminant will determine the degree of cleaning. If the level of contamination cannot be readily determined, cleaning should be based on the assumption that the equipment is highly contaminated.

Waste products produced by the cleaning procedures such as waste liquids, solids, gloves, used Chem-wipe® cleaning pads, etc., should be collected, stored in USDOT-approved 55-gallon drums on-site and disposed based on the nature of the contaminant. Specific details for the handling of these wastes should be addressed by the project manager.



## STANDARD OPERATING PROCEDURE for EPA Brownfield Grant Projects

### **E.2410 CLEANING – MANUAL WASHING**

**LAST REVIEW OR REVISION:** June 2010

#### **OBJECTIVE AND APPLICATION**

To prepare the equipment for field activities in a manner that minimizes the potential for obtaining biased or erroneous data due to contaminant transfer between sampling locations. Cleaning is performed as a quality assurance measure and a safety precaution. It minimizes cross-contaminants between samples and also helps to maintain a clean working environment.

#### **EQUIPMENT**

- As determined by the project manager
- Expendable supplies:
  - Disposable chemical-resistant gloves
  - Chem-wipe® cleaning pads
  - Garbage bags
  - Laboratory glassware detergent such as Alconox or Trisodium Phosphate (TSP)
  - Containers for collection of waste liquids, if necessary
  - Dilute acid, methanol, isopropyl alcohol, ethanol or other cleaning fluid
- Wash rack facility
- Cleaning containers with brushes (plastic, steel or stainless steel buckets)
- Aluminum foil or plastic
- Source of potable water without chemicals that would interfere or be identified in chemical analysis of samples. The project manager may require laboratory testing of cleaning water as a background for evaluating chemical analyses.

#### **PROCEDURES**

Cleaning procedures will vary considerably based on the equipment, type of contaminant, type of sample and detection levels. Initial cleaning should take place at the site prior to demobilizing. This will minimize the spread of contamination. The extent of on-site cleaning will vary based on

specific conditions; however, an attempt should be made to decontaminate as thoroughly as possible on site. The more care one applies on keeping the equipment clean, the less energy will be required on cleaning.

All field equipment must be prepared at the laboratory/office prior to use. This will include additional cleaning, inspection, and maintenance.

Equipment such as hand trowels, bailers, mixing bowls, hand augers, etc., should be cleaned and wrapped in aluminum foil (with shiny side out) or plastic, as appropriate, prior to mobilization.

Sampling and monitoring equipment is normally cleaned by washing and rinsing with liquids such as a soap or detergent solution, potable tap water, deionized water (DI), methanol, isopropyl alcohol or a dilute acid.

The extent and type of contaminant will determine the degree of cleaning. If the level of contamination cannot be readily determined, cleaning should be based on the assumption that the equipment is highly contaminated.

Listed below is a cleaning procedure which may be employed for field equipment such as a water level indicator at a monitoring well which contains dissolved petroleum hydrocarbons. If different or more elaborate procedures are required, they should be specified by the project manager during the project initiation meeting.

- Remove gross contamination from the equipment using a Chem-wipe® cleaning pad or brush.
- Wash with a soap or detergent solution
- Rinse with D.I. water
- Rinse with methanol or isopropyl alcohol (if method requires) and repeat rinse with D.I. water
- Repeat the entire procedure or any part of the procedure as necessary.

Waste products produced by the cleaning procedures such as waste liquids, solids, gloves, used Chem-wipe® cleaning pads, etc., should be collected and disposed of based on the nature of the contaminant. Specific details for the handling of these wastes should be addressed by the project manager.



## STANDARD OPERATING PROCEDURE for EPA Brownfield Grant Projects

### E.2420

## CLEANING – HIGH-PRESSURE, HOT-WATER WASHING

Last Review or Revision: June 2010

### Objective

To prepare the equipment for field activities in a manner which minimizes the potential for obtaining biased or erroneous data due to contaminant transfer. Decontamination is performed as a quality assurance measure and a safety precaution. It minimizes cross-contaminants between samples and also helps to maintain a clean working environment.

### Equipment

- As determined by the project manager
- High pressure hot/cold water washing device or steam cleaner
- Expendable supplies:
- Disposable chemical-resistant gloves
- Chem-wipes
- Garbage bags
- Detergent (Alconox or TSP)
- Containers for collections of waste liquids, if necessary D.I. water
- Dilute acid, methanol, ethanol or other cleaning fluid
- Wash rack or other approved decontamination fluid collection system
- Cleaning containers with brushes (plastic, steel or stainless steel buckets)
- Aluminum foil or plastic, as appropriate
- Safety monitoring devices as specified in the safety plan.

### Procedures

Decontamination procedures will vary considerably based on the equipment, type of contaminant, type of sample and detection levels. Initial decontamination should take place at the site prior to demobilizing. This will minimize the spread of contamination. The extent of on-site decontamination will vary based on specific conditions; however, an attempt should be made to decontaminate as thoroughly as possible on site. The more care one applies on keeping the equipment clean, the less energy will be required on decontamination.

All field equipment must be prepared at the laboratory/office prior to use. This will include additional decontamination, inspection, and maintenance.

Equipment such as hand trowels, bailers, mixing bowls, hand augers, etc., should be cleaned and wrapped in aluminum foil (with shiny side out) or plastic, as appropriate, prior to mobilization.

Decontamination of larger objects, such as the working end of the drill rig or the downhole tools is accomplished using a high pressure wash.

Sampling and monitoring equipment is normally cleaned by washing and rinsing with liquids such as soap or detergent solutions, tap water, D.I. water, methanol, or a dilute acid.

The extent and type of contaminant will determine the degree of decontamination. If the level of contamination cannot be readily determined, cleaning should be based on the assumption that the equipment is highly contaminated.

Listed below is a decontamination procedure which may be employed for field equipment such as a water level indicator at a monitoring well which contains dissolved petroleum hydrocarbons. If different or more elaborate procedures are required, they should be specified by the project manager during the project initiation meeting.

- Remove gross contamination from the equipment using a chem-wipe or brush.
- Wash with a soap or detergent solution
- Rinse with D.I. water
- Rinse with methanol or other alternate cleaning agent (if method requires)
- Rinse with D.I. water
- Repeat the entire procedure or any part of the procedure as necessary.

Waste products produced by the decontamination procedures such as waste liquids, solids, gloves, chem-wipes, etc., should be collected, stored in USDOT-approved 55-gallon drums on the site, and disposed based on the nature of the contaminant. Specific details for the handling of these wastes should be addressed by the project manager.



## STANDARD OPERATING PROCEDURE for EPA Brownfield Grant Projects

### E.3000

### BULK SAMPLING OF SUSPECT ASBESTOS-CONTAINING MATERIAL (ACM)

**Last Review or Revision: June 2010**

#### **I. PURPOSE**

The purpose of this standard operating procedure (SOP) is to provide information on the hazards of asbestos and procedures to follow to sample suspect materials for laboratory analysis. The following guidelines contained in this document apply to Terracon personnel who engage in bulk sampling of suspect ACM and are designed to provide standardization with respect to sample collection. This procedure should ensure that potential asbestos-containing material samples are collected in a manner which allows for accurate analysis of the material and that sampling personnel are protected against potential asbestos fiber releases through controlled sampling techniques or appropriate personal protective equipment.

The objective of bulk sampling building materials and components suspected to contain asbestos is to characterize the items that contain asbestos in quantities equal to or greater than 1% or other content limit as specified by local or state guidelines. By characterizing the locations and quantities of asbestos-containing materials (ACM), exposure hazards can be greatly reduced.

#### **II. BACKGROUND AND REFERENCE**

Asbestos has been a common component used in several building materials because of its strength enhancing and fire resisting properties. However, asbestos has been recognized as a human carcinogen and respiratory hazard. Due to its health hazards, building inspections and asbestos bulk sampling is requested for schools and many public or commercial properties prior to building renovation or demolition activities. Therefore, identifying, locating and quantifying materials containing asbestos is essential in the effort to prevent worker exposure to asbestos and prevent environmental contamination.

As a consequence of inhalation of asbestos fibers, a body of federal and state regulations has been developed. Federal regulations pertaining to asbestos are included in AHERA (Asbestos Hazard Emergency Response Act) US EPA 40 CFR 763, Subparts E, F; NESHAP (National Emissions Standards for Hazardous Air Pollutants (EPA 40 CFR 61); OSHA Asbestos Standards (29 CFR 1910.1001 and 29 CFR 1926.1101), and ASHARA (Asbestos School Hazard Abatement Reauthorization Act). Many states and local authorities have additional requirements including state-specific licensing and certification.



Terracon will comply with applicable federal, state and local regulations when conducting asbestos-related services.

### **III. EQUIPMENT**

The minimum equipment necessary to conduct bulk sampling of suspect materials, in addition to the personal protective equipment outlined below in the Health and Safety Section, is listed below.

- Utility Knife, Chisel, Hammer, Screwdriver, Coring Tool
- Duct Tape
- Sample Containers (preferably ziplock-style clear plastic bags)
- Sample Labels and Indelible Marker
- Spray Atomizer containing Detergent Amended Water, Paper Towels/Wet Wipes
- Spray Adhesive
- Roof Patch Kit (if necessary)
- Measuring Wheel
- Camera
- Flashlight
- Field ACM Sample Log

### **IV. CERTIFICATION**

Individuals conducting asbestos sampling must have the certifications listed below. Copies of these certifications and licenses should be taken to the site during the sampling event.

- United States Environmental Protection Agency Building Inspector training (and refresher training, if applicable)
- Asbestos Inspector State-license for the state of the project location (where necessary)

In addition, Terracon requires company-based training courses and hands-on experience of employees prior to commencing asbestos-related field services. Each employee must also receive respirator training, be medically monitored and successfully pass a fit-test utilizing issued respirator(s).

### **V. HEALTH AND SAFETY**

Asbestos has been recognized to cause asbestosis, cancer of the lungs and digestive tract and mesothelioma. Asbestosis is a lung disorder characterized by a diffuse interstitial (between cell) fibrosis. The onset of asbestosis probably depends upon the asbestos dust

concentration, the morphology of the fiber and length of exposure. Cigarette smoking is strongly implicated as a co-carcinogenic among asbestos workers.

Under the OSHA asbestos standards, the employer has an obligation to protect employees against exposure to asbestos fibers in excess of 0.1 fibers per cubic centimeter of air (0.1f/cc). Personnel engaged in asbestos-related activities (including building inspections) must be trained, medically cleared and fit-tested for respiratory protection. Therefore, enrollment in a medical surveillance program in compliance with the OSHA asbestos and respiratory protection standards is mandatory. Terracon employees are not permitted to engage in asbestos-related activities unless they are enrolled in the Terracon medical surveillance program and have been medically cleared for respirator use by a physician.

The following safety and health protocols apply to Terracon personnel who engage in asbestos-related services. The guidelines contained in this document are based upon potential health hazards from exposure to asbestos fibers and physical hazards which may be encountered on survey project sites. Field activities will be performed in accordance with the procedures outlined in this document and applicable federal/state health and safety regulations.

Terracon personnel will use professional judgment during sample collection to prevent exposure to other building occupants. If unauthorized personnel attempt to enter a sampling area which could reasonably pose a fiber release hazard, the inspector will curtail bulk asbestos sample collection activity and request that the individual(s) leave the work area. If unauthorized personnel refuse to leave the work area, immediately contact the Project Safety Officer and/or a client representative. Sample collection activities should recommence only after unauthorized personnel have left the work area.

In the event that minor amounts of suspect asbestos containing materials such as thermal system insulation, sprayed-on or trowled-on surfacing materials, ceiling texture, etc. are released during the course of sampling, sampling team members will immediately evacuate the area and don Level C personal protective equipment. The area of potential ACM release will then be approached and suspect materials will be thoroughly wetted with amended water, slowly and deliberately swept to a centralized pile, re-wetted, and containerized in heavy mil asbestos disposal bags. Affected surfaces will then be re-wetted and swabbed with clean cloths or paper towels. Used wipes will be disposed of as asbestos-containing waste.

In the event that large quantities of potential ACM is released during sample collection activities, personnel will immediately evacuate the area and notify the Project Safety Officer and the client representative. The Project Safety Officer will request that the area be sealed until a properly attired response team can be mobilized to the area with a high efficiency particulate air filter (HEPA) vacuum and other equipment necessitated by site conditions.

If suspect materials are in deteriorated condition and fiber release appears likely, or if sampling must be conducted overhead and/or above drop ceilings, personnel will upgrade to Level C personal protective equipment as itemized above. Level C personal protective

equipment should be donned before moving drop ceiling panels, attic access panels, etc. where friable fireproofing or thermal system insulation are known to be present.

The indicated personal protective equipment shall be mobilized to asbestos sampling project sites on each day of sample collection and utilized, if necessary:

- Tyvek (standard) protective coveralls
- Half face or full face air purifying respirator equipped with HEPA (P-100) cartridges
- Impermeable gloves (nitrile or latex).
- Tyvek boot covers or washable outer footwear

Additional Health and Safety protocols such as those established by the owner/operator of the project site and Terracon's company policy regarding ladder safety, confined space entry and electrical hazards shall be followed.

## **VI. SAMPLING HAZARDS**

### **a. Elevated Surfaces**

Asbestos building inspections may include roofing materials and ceiling spaces containing suspect ACM. Appropriate ladders or other suitable devices (e.g., manlifts) will be used for gaining access to elevated sampling locations. Ladders will be inspected prior to use. Spreaders will be fully extended on all step ladders and firmly positioned prior to use. Where footing is uncertain, a sample team member will hold or otherwise secure ladders while in use by another sample team member. Personnel must always face ladders during both ascent and descent. Extension ladders will not be positioned more than one-quarter of their working length from buildings, walls, etc. (4:1 pitch). Sample team personnel will not walk on steeply pitched roof surfaces and will not walk on low pitched roofing surfaces while wet. Remain on designated roof walkways wherever present. Terracon personnel will visually inspect roofs prior to beginning sample collection activities and will avoid all areas which appear to be structurally unsound.

### **b. Confined Space Entry**

Terracon asbestos inspectors will not enter any pit, shaft, tunnel, etc. which has limited means of egress, the potential for an oxygen deficient or toxic atmosphere or which was not designed for human occupancy without first developing a written safety plan which includes a confined space entry permit and procedures. Readily accessible spaces such as pipe tunnels in which personnel may stand can be entered to a distance where continuous visual and verbal communication can be maintained with another sample team member.

Adequate portable lighting must be utilized during sample collection in tunnels and similar spaces. No Terracon or sample team member may attempt to walk through a pipe tunnel,

etc. beyond the sight of a stand-by team member unless written confined space entry procedures have been prepared for the project.

### **c. Electrical Contact Hazards**

Personnel will remain cognizant of the location and condition of electrical wiring during the collection of bulk asbestos samples. A visual assessment of each work space will be made prior to sample collection and electrical contact hazards will be evaluated. Unguarded junction boxes, exposed wiring, knife switches, etc. will be avoided during the collection of bulk ACM samples, and coring tools will not be used in near proximity to electrical switches or receptacles.

## **VII. PROCEDURES FOR BULK SAMPLING OF SUSPECT ACM**

The primary purpose of this section is to identify the methods and techniques of controlled sampling, sampling site control and use of appropriate personal protective equipment to protect Terracon personnel and members of the general public from exposure to asbestos fibers during sampling activities. Adherence to these procedures should enhance personnel safety during sample collection activities and aid in the suitability of samples for analysis. Field activities will be performed in accordance with the procedures outlined in this document and applicable federal/state health and safety regulations.

Protocols for inspection and bulk sampling are defined in AHERA regulations. These are applicable for any type of survey; for example, a school, an area prior to renovation, a building prior to demolition and inspections undertaken to rebut the OSHA presumption that certain materials contain asbestos.

An accredited Building Inspector must perform the inspection. A summary of AHERA sampling protocols is as follows:

1. Visually inspect the building interior and/or exterior and identify locations of suspect ACM. Identify homogenous areas of friable and non-friable suspect ACM. Document locations, condition, classification and estimated quantities of each suspect material. It is recommended to depict locations of materials on a building diagram and take photographs of sampled materials.
2. Touch each suspect ACM to determine its friability.
3. Collect representative samples of suspect ACM. Terracon recommends a minimum of three (3) samples of each material be collected from each homogeneous area. However, specific materials may require additional samples such as surfacing material and insulation

as described below. Judgment should be used on the need for and quantity of additional sample collection.

*Surfacing materials:* Collect, in a statistically random manner, at least 3 bulk samples from each homogenous area of 1,000 sq. ft. or less, at least 5 bulk samples from each homogenous area that is greater than 1,000 sq. ft. but less than or equal to 5,000 sq. ft., and at least 7 bulk samples of each homogenous area larger than 5,000 sq. ft.

*Thermal System Insulation (TSI):* Collect, in a randomly distributed manner, at least three bulk samples from each homogeneous area of TSI; collect at least one bulk sample from each homogeneous area of patched TSI if the patched section is less than 6 linear or square feet; collect bulk samples from each insulated mechanical system where cement or plaster is used on tees, elbows, etc. in a manner sufficient to assess whether the material is ACM.

If fiber release appears likely, wet methods will be employed in the collection of suspect ACM samples. Water amended with a minimum of 10% commercially available window cleaning solution or other suitable surfactant should be used to moisten materials prior to sampling. Bulk asbestos samples will not be collected over the heads of, or in near proximity to, non-project personnel. Respiratory protection is not required when sampling non-friable suspect materials or materials below the breathing zone which are adequately wetted with amended water.

4. Bulk ACM samples should be immediately placed in sample containers and sealed while the materials are wet. If collecting samples of friable ACM or normally non-friable materials which are in deteriorated condition, precautions must be taken to prevent the release of fibers to the work area. Precautions include aggressively wetting the surface or potentially isolating the material (e.g. glove bagging) prior to disturbance.

5. Reusable sampling equipment will be gently rinsed with amended water. Dry the equipment with paper towels to be disposed of as contaminated materials.

6. The following decontamination sequence should be used following sample collection activities requiring Level C personal protective equipment:

- Remove coveralls slowly turning the outside inward.
- Place in heavy mil asbestos disposal bag.
- Remove gloves and shoe covers (if utilized)
- Remove respirator and carefully dispose of respirator cartridges in asbestos disposal bag.
- Securely seal protective clothing and any potentially contaminated disposable sampling equipment in heavy mil asbestos disposal bags.
- Do not smoke or eat with soiled hands.

- Wash hands, face and forearms thoroughly before eating, drinking smoking or using toilet facilities.
- Shower thoroughly as soon as possible upon leaving the project site.

7. Bulk sample analysis for asbestos content is performed by polarized light microscopy (PLM). The analytical testing procedure is based on U.S. Environmental Protection Agency (EPA) methods and National Voluntary Laboratory Accreditation Program (NVLAP) requirements. Terracon will use NVLAP accredited and appropriately licensed laboratories for analysis of asbestos bulk samples. Samples will be controlled with the analytical laboratory through chain of custody documentation.



STANDARD OPERATING PROCEDURE for EPA Brownfield Grant Projects

**E.4010**  
(Formerly E.590)

**AIRBORNE LEAD AND PARTICULATE MATTER MONITORING  
SAMPLE COLLECTION**

**Last Revision/Review:** March 2014

**Reviewer / Office:** DEK/Corporate

**Objective and Application**

Indoor air sampling requires the participation / review of a Terracon industrial hygienist (IH) in selecting methods and scoping work. Engaging an IH is encouraged for any airborne contaminants. For direction to local or regional assistance, contact the Chair of the Industrial Hygiene Practice Resource Group on the Terracon Environmental Services Webpage. Click [here](#) if viewing electronically.

The following procedure is for collection of samples for measurement of total airborne particulate matter and airborne lead particulate. The methods will provide representative samples for laboratory analysis using NIOSH Method 7300.

**Equipment**

The following equipment and supplies will be needed for this testing:

- Air monitoring cassettes containing mixed cellulose ester filters with a 0.8  $\mu\text{m}$  pore size pre-weighed and numbered by the laboratory.
- Rotometer or other flowmeter accurate to the 0.1 L/min. Flowmeters used for calibration of air sample pumps will be calibrated against a primary standard on a quarterly basis.
- Air monitoring pump (battery operated or ac powered depending on application) capable of provided a 1 to 4 L/min flow rate through the sample filter.
- Vinyl tubing to connect pump to cassette.
- Cassette stand or other means to fix cassette in place as appropriate to testing location.
- Chain of Custody.

**Procedures**

Select a location for sample that is subject to full ambient air flow but not subject to vibration that could dislodge particulates from the surface of the filter. A location protected from precipitation should be selected, if available. Excessive moisture will interfere with sample analysis and could effect the flow rate.

Label cassette and record laboratory identification number on chain of custody. Assemble sampling pump, tubing and stand in sample collection location. The base of the cassette should be a press fit into the interior of the tubing. The joint between the tubing and cassette may be reinforced with tape if site conditions make this necessary. Cassette must be tilted downward at a 45° angle from horizontal. Cassette and pump should be placed so that the sample does not have to be moved after sample calibration.

A short section of vinyl tubing should be used to connect the flowmeter to the inlet port of the cassette. An adapter fitting may be needed to connect the tubing to the cassette. If a rotometer is used for flow calibration, the instrument must be held upright for accurate readings. Turn on the pump and measure the flow rate. Using the flow control on the pump, adjust the flow to the desired reading between 1.0 and 4.0 L/min. Record the sampling start time and beginning flow rate.

After completion of the sample collection, inspect the pump and cassette for any problems that may affect the sample validity (wet filter, stand blown over, etc.) and record any problems noted. Measure the flow rate using the procedure described above. The average of the two flow rates will be used by the laboratory to calculate the sample volume. Turn off the pump and cap the inlet and outlet ports on the filter cassette. Record the sampling completion time and ending flow rate.

## **Documentation**

In addition to chain of custody documentation, the following must be provided to the laboratory performing sample analysis:

- Average flow rate (average of beginning and ending readings)
- Sample duration
- Filter number
- Requested analytical method

The following additional information must be collected for Terracon's project files:

- Sample date
- Sample times
- Sample location
- Activities performed by during the sampling
- Wind orientation (upwind, downwind, etc.)
- Weather conditions

## **Attached or Referenced Supporting Information**



- Industrial Hygiene Technical Manual – Chapter II: Standard Methods for Sampling Air Contaminants
- NIOSH Method 7300 – Elements by ICP

# **Appendix C:**

# **Terracon Corporate Quality Program**

# **Manual**

# PROJECT QUALITY MANUAL

**Prepared by:**

Quality and Project Delivery Committee

**Adopted by:**

Executive Committee

June 3, 2021

**Revision:**

CORP-PQM-6-21-00

This document is an internal manual and is not to be distributed in any format outside of Terracon for any reason.

**Terracon**



## TABLE OF CONTENTS

### INTRODUCTION

### REVISION RECORD

|                                                                                 | <u>Page</u> |
|---------------------------------------------------------------------------------|-------------|
| <b>1.0 PURPOSE AND SCOPE</b> .....                                              | 1           |
| <b>2.0 ROLES AND RESPONSIBILITIES</b> .....                                     | 2           |
| 2.1 Project Manager (PM) .....                                                  | 2           |
| 2.2 Authorized Project Reviewer (APR) .....                                     | 6           |
| 2.3 Project Executive (Project EXEC) .....                                      | 8           |
| 2.4 APR Review Committee (APRRC) .....                                          | 8           |
| 2.5 Service Line Director (SLD) .....                                           | 9           |
| 2.6 Chief Development Officer (CDO) .....                                       | 9           |
| 2.7 Operations Management .....                                                 | 9           |
| <b>3.0 PROJECT TYPES</b> .....                                                  | 12          |
| 3.1 Type I Projects .....                                                       | 12          |
| 3.2 Type II Projects .....                                                      | 13          |
| <b>4.0 PROJECT QUALITY PROCESSES</b> .....                                      | 14          |
| 4.1 Project Proposals .....                                                     | 14          |
| 4.2 Project Execution .....                                                     | 15          |
| 4.3 Project Closeout .....                                                      | 19          |
| <b>5.0 PROGRAM COMPLIANCE</b> .....                                             | 20          |
| <b>6.0 DOCUMENT CHANGES</b> .....                                               | 21          |
| Appendix A Definitions .....                                                    | 22          |
| Appendix B Project Quality Duties and Responsibilities .....                    | 25          |
| Appendix C Quality Control Tiers .....                                          | 26          |
| Appendix D Project Review Process .....                                         | 28          |
| Appendix E Data-Only Review Project List .....                                  | 30          |
| Appendix F Project Quality Review Responsibilities for Materials Services ..... | 31          |
| Appendix G PM and APR Appointment and Review .....                              | 34          |
| Appendix H APR Approval Criteria .....                                          | 40          |
| Appendix I PM and APR Evaluations .....                                         | 43          |
| Appendix J APR Continuing Education .....                                       | 44          |
| Appendix K APR Project Review Checklist .....                                   | 46          |
| Appendix L Data-Only Reviewer Approval .....                                    | 48          |
| Appendix M Data-Only Reviewer Appointment Process .....                         | 49          |
| Appendix N Type II Project Delivery .....                                       | 50          |
| Appendix N.1 Type II Proposal Process .....                                     | 51          |
| Appendix N.2 Type II Project Process .....                                      | 53          |
| Appendix N.3 Project EXEC Oversight Checklist .....                             | 55          |
| Appendix N.4 Project Management Plan Templates .....                            | 58          |
| Appendix N.5 Type II Project Process Meeting Agenda .....                       | 67          |

## REVISION RECORD

| Rev. Date | Section | Type | Description of Change |
|-----------|---------|------|-----------------------|
|-----------|---------|------|-----------------------|

Employee-owner,

Quality is a part of everything we do at Terracon. It is woven throughout our Strategic Plan, our safety culture, and our overarching goal of on-time project delivery. Our values of excellence, integrity, curiosity, and caring inform our approach to quality in all aspects of project management and delivery, and quality is non-negotiable if we are to live our values of integrity and prosperity and achieve our vision of being dominant in our markets. Above all, quality is how we honor and demonstrate our commitment to the safety of our employees, clients, and everyone in the communities who are touched by the work we do. Every client, every project, every day.

If our Strategic Plan is the touchstone for our quality approach, our Project Quality Manual (PQM) serves as a roadmap and “instruction manual” to ensure consistency and discipline around quality across the company.

All the quality leaders mentioned in this document – from project managers and authorized project reviewers to service line directors and operations managers – set the tone for all employees in following our quality procedures and in keeping a mindset of quality as part of client experience, on-time project delivery, and maintaining and growing our brand and reputation in the markets we serve.

As you use this manual, be sure to explore beyond the surface of the processes and policies to consider why they are so important to the safety and success of our employees, clients, and communities, and how you can lead Terracon to attain the highest standards of quality on every project.

Thank you for your commitment to quality, to our clients, and to our company.



**M. Gayle Packer**  
Chair, President, and CEO

## 1.0 PURPOSE AND SCOPE

This Project Quality Manual (PQM) defines Terracon's project quality management processes, consistent with our [Quality Program Manual](#), for the processes, tasks and deliverables associated with projects performed by the company.

Terracon's projects often result in opinions, conclusions and recommendations supported by field and laboratory data gathered in the process of conducting the project as well as calculations using that data. Terracon also engages in projects where we provide repair, remediation and design documentation. This manual sets out the approach to quality associated with the execution of the project and how those opinions, conclusions, and recommendations are developed and finalized. Aspects of quality related to the gathering of such field and laboratory data, and the performance of calculations and designs are addressed in a companion document, [Quality Management System \(QMS\)](#).

Terracon also maintains and implements project-specific quality control or quality assurance manuals and/or programs as required or when applicable by project contracts that align to or incorporate this document. In addition, Terracon utilizes other comprehensive quality-related documents on designated projects, such as the [NQA-1 Quality Assurance Manual](#), when necessary.

Specific key words are ***bolded and italicized*** when first utilized in the text of the manual. The definitions for these words can be found in [Appendix A](#).

This manual expands on specific ***Quality Control (QC)*** and ***Quality Assurance (QA)*** responsibilities. QC and QA are terms that are used interchangeably but are distinct in their purpose that when used in conjunction, creates an effective Quality Program. In the Terracon quality program, Quality Control occurs at the project level and includes the various reviews of documents, deliverables, calculations and data. Quality Assurance includes development and oversight of the quality control program, including verification that appropriate reviews were completed, and validation of the program through audits, surveys and reviews of those who are authorized to perform the quality control.

The foundation of Terracon's quality program is the ***Project Manager (PM)*** and ***Authorized Project Reviewer (APR)***. Every project at Terracon has an assigned PM and an APR, regardless of size. The PM responsibilities include overall project performance, on-time delivery, management of budget and scope while maintaining a safe work environment, managing risk and delivering a quality product to meet the satisfaction of the client. The APR's responsibilities include the oversight of quality of the work and the [guidance](#) of the project's aspects of schedule, budget, risk, scope, safety and client satisfaction.

Projects at Terracon are identified as either ***TYPE I*** or ***TYPE II***. All projects require an APR; however, ***TYPE II*** projects are required to follow the ***TYPE II PROJECT PROCESS*** and includes the additional designation of a ***Project Executive (Project EXEC)***. Section 3 further defines Type I and Type II projects, as well as the ***TYPE II PROJECT PROCESS***.

## 2.0 ROLES AND RESPONSIBILITIES

Terracon's QC and QA process relies on the partnership and leadership of four primary groups:

- PMs;
- APRs and their supporting role players in the quality process—**Data-Only Reviewers (DORs)**, **Subject Matter Experts (SMEs)** and **Project EXECS**;
- Service Line Leadership: **APR Review Committee (APRRC) members**, **Service Line Directors (SLDs)**, and **Assistant Service Line Directors (ASLDs)**; and
- Operations Management: **Department Managers (DPMs)**, **Office Managers (OMs)**, **Division Managers (DMs)**, and **Operating Group Managers (OGMs)**

The **Chief Development Officer (CDO)** oversees the processes related to the project QC roles through various QA activities. [Appendix B](#) provides a summary of Terracon's Roles and Responsibilities for each of these groups.

The following sections address roles and responsibilities of specific staff engaged with projects.

### 2.1 PROJECT MANAGER (PM)

The PM is an integral position to the success of a project, not only financially but in terms of quality, client experience, and on-time delivery. In this manual, the term **Project Manager** refers to the role of PM, as well as the Terracon Job Title of Project Manager. The role of PM is assigned on a project when a proposal or project is registered in Terracon's **Project Exchange System (PX)**.

Terracon employees are selected and approved as PMs by the DPM or OM through experience, training and competency as guided by the [Terracon Project Manager Selection and Approval Requirements](#).

The PM is assigned to a project by the DPM and is ultimately responsible for **all** aspects of the project. The following critical items must be performed by everyone assigned the role of PM and responsible for managing projects at Terracon, including, but not limited to:

#### **Proposal Preparation and Follow-up (Excellence)**

- Prepare proposals with a well-defined scope of work, schedule, budget, and considerations for safety. Each project should have a calculated (planned) WU/WD in the proposal folder.
- Ensure the proposal and the project are accurately and completely set-up and validated in PX, including working with the DPM, OM, APR, ASLD and Project EXEC as required, to identify the project type.
- Create and manage an adequate scope, schedule and budget to deliver the project.



**Signed Contracts and Change Orders** (*Prosperity*)

- Ensure all projects have signed contracts prior to initiating services.
- Anticipate and seek written client approval for scope, schedule and budget changes prior to performing additional work outside the originally approved scope, schedule and budget.

**Kick-Off Meetings** (*Curiosity, Client Engagement*)

- Plan and conduct project **Kick-Off Meeting(s)**.
- Conduct **Client-Engaged Kick-Off Meetings** using the Client Portal whenever appropriate.
- Determine and initiate **Critical Juncture** meetings consistent with the schedule established in the project kick-off meeting.

**Safety / IIF** (*Caring, Best at People*)

- Take personal responsibility for the safety of those that work on your projects and assign all work in an *IIF* manner.
- Establish safety protocols throughout the life of the project consistent with [Terracon's Core Safety Rules and Practices](#) and [Life Safety Absolutes](#) as well as any project-specific safety requirements.
- Understand safety hazards on the project site(s) and assure that all staff have adequate information, training, and certification to safely perform their assigned tasks and services.
- Perform periodic site check-ins during field activities throughout the duration of the project to engage staff in conversations that include critical safety and other project-related issues.

**Financial Management** (*Prosperity*)

- Use the available systems and tools (including the PM Dashboard) to manage project financials including meeting budget at planned write up/write down (WU/WD).
- Provide and maintain tracking of planned WU/WD, costs, budget status, accurate and timely invoicing, WIP, collections, schedule and budget forecasting, submit change orders promptly, and eliminate unrecognized revenue (UR).
- Perform and provide project cost estimates at completion (EAC) and estimates to complete (ETC).

**Client Experience (CX) / Client Development (CD)** (*Client Engagement, Prosperity*)

- Provide consistent, intentional and focused effort with existing and/or new Clients that result in high client engagement (measured by the work they ask us to perform for them), and mutual success.

**Risk Management** (*Integrity*)

- Understand and manage project technical, schedule, financial, contractual and client risks.
- Complete project closeout in a timely manner, consistent with the requirements of this PQM.
- Responsible for the integrity and management of project files and data.

**Quality** (*Excellence*)

- Understand and follow the expectations of the PQM.
- Understand and follow the APR process for all projects and apply the additional requirements for Type II projects when required.

- Manage all aspects of quality – quality of our services, quality of our communication, and quality of our deliverables and report(s).
- Engage the APR at critical junctures from proposal preparation through project completion to allow the APR to perform their duties as described below in Section 2.2.
- Engage with the ASLD and Project EXEC at appropriate times to meet expectations set forth in project planning meetings, kick-off meeting(s) and implementing the project management requirements established by the Project EXEC on Type II projects.
- Collaborate with the APR to identify the need for and selection of SMEs.
- Maintain adequate project records and filing in accordance with [Terracon's Records Management Policies](#) up through project closeout.
- Ensure that licensing and certification requirements for the project are met.
- Manage overall quality of the project and deliverables.

**Communication** (*Best at People, Integrity*)

- Establish and maintain effective and regular client communication and professional relations during the project.
- Communicate openly at all levels and collaborate by engaging staff in achieving project goals (including project personnel, APRs, NAMs, etc.).

**Teamwork** (*Best at People*)

- Lead the project team so they understand their roles and budgets.
- Coordinate with subcontractors, SMEs and other design team members to successfully execute the project.

**On-Time Delivery** (*Excellence, Integrity, Market Dominance, Client Experience*)

- Develop schedules for all projects, make sure the project team and the client know the schedule, share it, track it, and communicate status on a routine basis with the project team, client, and other relevant parties.
- Deliver on time in all aspects of our services, including but not limited to proposal, services, reports, invoicing, collections, change orders, meetings, and overall client communications.
- Manage the project schedule to allow for adequate time for all reviews prior to submission of a work product to the client.

**Consistent Standards** (*Excellence*)

- Maintain established Terracon standards for project delivery.
- Maintain consistency in use of formats, forms and features.

The PM should proactively coordinate with the APR during the proposal phase and keep the APR, and SME when applicable, involved throughout the project, particularly at the kick-off meeting and other critical junctures. For Type II projects when a Project EXEC assigned, the PM should also engage the Project EXEC similar to the APR in the descriptions noted below and as discussed in [Appendix N](#) of this PQM. The PM is specifically responsible for the following tasks as the project progresses from proposal through execution.

## Project Proposal

- Verifying, notifying and communicating directly with the APR when they are selected in PX.
- Engaging the APR and SME during proposal preparation and contract review to discuss the following:
  - Project scope, staffing, scheduling and budget reviews and discussions;
  - Contract or risk issues so appropriate reviews and approvals are obtained;
  - Project safety requirements for consideration in scope, schedule and budget; and
  - Project delivery schedule and client milestone dates

## Project Execution

- Confirming the DORs for Materials or Facilities service line projects with deliverables or tasks not containing opinions, recommendations, or conclusions. The PM may serve as a DOR.
- Verifying, notifying and communicating directly with the APR when they are selected upon project award, and if there has been an APR change after project has been won, bring the new APR up-to-date on the proposal and project.
- Having discussions with the APR to determine when/if an SME is needed for the project. As with the APR, notify and communicate directly with the SME when they are selected upon project award. SME's may be added to the project team during the life of a project due to a scope change or other technical or management needs.
- Reviewing [Risk Management Policy No. 4](#) for the requirement to include specialized SMEs to the project team.
- Initiating project kick-off meeting(s) that includes the APR, SME(s), Project EXECs (if appropriate) and other key project staff. (Note: Separate or conjoined client-engaged kick-off meetings should be held whenever possible.)
- Establishing critical junctures for subsequent interaction with the APR, the client and the design team as a part of the kick-off meeting(s).
- Coordinating with the APR and any SMEs throughout the project and keep the APR, SMEs and Project EXEC up-to-date on schedules and critical junctures, as set out in Section 4 of the PQM.
- Engaging the APR (and Project EXEC when required) at critical junctures to review project status, including ability to meet scope, schedule and budget.
- Providing interim project deliverables, as established in the kick-off meeting(s), to the client and to the design team to enhance collaboration.
- Set, monitor and keep all project milestones as established in the kick-off meeting(s).
- Performing periodic site safety check-ins with field staff during the project and engage the APR to review and discuss safety issues throughout the project.
- Engaging the APR to discuss anticipated change orders (supplements, contract modifications), and create a plan to gain client approval in advance.
- Providing the APR and any SMEs, in a timely manner, with necessary documentation for review, including the project deliverables (including access to client communications) and access to calculations and supporting documentation.
- Providing draft deliverables to the APR in appropriate advance time of the established milestones, unless other arrangements have been made with the APR. The draft deliverable shall be prepared using care, expertise, and attention to detail as to expect little or no changes or review comments from the APR. The draft deliverable shall include

appropriate supporting materials such as field notes, photographs, etc. to aid the APR in their review.

- Making any necessary modifications as mandated by the APR consistent with the schedule expectations of the client and deliver final documents to the client as required by the project schedule.

#### Project Closeout

- Performing project closeout consistent with Terracon's policies, processes and procedures presented in **Section 4.3** in this PQM.

## 2.2 **AUTHORIZED PROJECT REVIEWER (APR)**

APRs play a critical role, driven by curiosity, excellence, integrity, and courage as a project quality champion. An APR is assigned to every project. For the majority of Terracon's projects, the APR is the "senior" member of the project team, and in this role, APR oversight and involvement is expected in four critical areas:

- **Project Quality** – The APR is responsible to confirm that the proper expertise is provided for the project from the proposal stage, and the deliverables meet Terracon's standards as well as the client's expectations. The APR should work with the PM in reviewing [Risk Management Policy No. 4](#) to consider whether one or more aspects of the project require SMEs and, if SMEs are deemed necessary, to select appropriate SMEs during the proposal stage and/or Project Setup, or when deemed necessary as the project progresses. Additionally, the APR may select an SME to support the project and collaborate with the PM. In some cases, the SME may be selected to provide independent review of the project as determined by the APR and PM and, if so, would be assigned for the duration of the project.
- **Project Delivery** - The APR is expected to provide oversight and guidance on project delivery and other aspects of the project, including safety, schedule, budget, Terracon standards and client expectations. Throughout the course of the project, the APR is responsible to 'check in' at predetermined critical juncture, or more frequently, with the PM to verify the status of the project's plan to meet scope, schedule and budget. The APR is expected to use their experience to coach other members of the project team into successful results in the areas of the project for which they are assigned as appropriate and to work actively with operations management to correct any shortcomings in those areas if corrective measures are not being taken by the project team members.
- **Risk Management** – The APR has oversight responsibility for evaluating project-specific risk factors (e.g. critical assumptions, subcontractors, project staff availability and experience, definition of out-of-scope items, contractual risk elements, technical issues, potential client dissatisfaction, compliance with [Terracon's Risk Management Policies](#), etc.) and is expected to collaborate with the PM to mitigate identified risks. The APR should be engaged in the identification of TYPE II projects that represent significant risk/opportunity for Terracon.
- **Coaching** - The APR is responsible to coach the PM from proposal to successful closeout of the project. Part of this coaching involves educating PMs on the role of the APR so there is a mutual understanding of the role and responsibility of the APR on the project and the importance of frequent communication and client/design team collaboration at critical

junctures defined for the project. The APR is responsible for coaching professionals on the project team and holding all accountable for the safe and successful completion of the project, consistent with [Terracon's Core Safety Rules and Practices](#) as well as any project-specific safety requirements; meeting expectations of the project's objectives of scope, schedule, safety, budget, technical quality, risk management and client satisfaction.

The extent of oversight and involvement by the APR may vary depending on the complexity of the project and/or the experience of the PM and project team. However, certain basic requirements and expectations are necessary for all projects, and the APR must ensure that their own involvement and the involvement of others is appropriate to deliver a successful project.

The APR selection is made by the PM, in discussion with the DPM and/or OM. The PM establishes the assignment at the time of proposal or project set up through PX. Prior to entering the project into PX, PMs shall engage the APR to confirm their availability to work on the project.

The APR is expected to accurately track their time spent on both proposals and projects and add their hours to their weekly timesheet accordingly.

APRs may be assisted in their quality responsibility by Data-Only Reviewers, Subject Matter Experts, and Project Executives, as well as other APRs.

### **2.2.1 Data-Only Reviewer (DOR)**

A DOR is the person(s) responsible for the review of factual data associated with final deliverables. For certain Materials and Facilities final deliverables that do not include professional opinions, recommendations or conclusions, we have designated staff who are authorized for "Data-Only Reviews." The DOR is the responsible party for the final deliverable as an official role. In this manual, the term "DOR" is only referenced for Materials and Facilities final deliverables.

### **2.2.2 Subject Matter Expert (SME)**

The APR may not always have the specific technical expertise required for certain aspects of a project. In this situation, SMEs can be added to a project team to provide additional support and to perform focused review in those areas. SMEs are experts within a specific subject matter and can also be appointed for other project delivery areas where additional expertise may be necessary, such as specific safety, quality, or project financial management assistance.

It is the responsibility of the PM and APR to collaborate and identify SMEs. The PM and APR should consult with the potential SME prior to assignment to ensure that the SME has the expertise needed.

An SME does not necessarily need to be an APR. Some of the project needs for an SME might be in areas where the organization does not have APRs such as accounting or legal. In addition, some technical experts may exist in the company who are not APRs, yet they should have opportunity to add value to projects using their expertise.



The SME should guide the technical performance of specific aspect(s) of a project within their specified area(s) of expertise. The SME does not replace the APRs involvement on the project. When an independent review is deemed necessary by the APR, SMEs should be called upon throughout the life of the project for guidance and review, from proposal through final project completion, as an independent reviewer from the project team.

Terracon performs certain project services that include specialized or increased risk, guided by [Risk Management Policy No. 4](#), where specialized SMEs are required to be selected and made an active part of the project team. Specialized SMEs are approved by the Services Lines as having the necessary background and expertise associated with the specialized or increased risk service. Approved specialized SMEs by practice area and service line are found on the [Quality and Project Delivery](#) pages on TerraNet.

## **2.3 PROJECT EXECUTIVE (Project EXEC)**

Project EXECs maintain the responsibility of executive-level oversight of TYPE II projects for successful delivery and for monitoring the project throughout its life to ensure that the project is proceeding in accordance with expectations. Project EXECs are not necessarily APRs, and a Project EXEC will not serve simultaneously as an APR on the same project for which they are assigned as Project EXEC. Projects are selected to have a Project EXEC assignment at the proposal stage, and in some cases the pursuit stage, as those of significant risk, exposure or opportunity. The PM, APR, or DPM each have responsibility to consider projects to be identified as TYPE II. It is the responsibility of the ASLD, in partnership with the DM, to confirm the identification of Type II Projects and the selection of the Project EXEC. By default, within PX, the ASLD is initially designated as the Project EXEC, unless there is agreement that a different Project EXEC should be designated.

The individual Project EXEC should serve on a TYPE II Project from the inception of the work scope development and fee estimation through the completion of the project and final closeout. The Project EXEC will define additional project management requirements to include activities such as Project Management Plans, project reviews, reporting, etc. The Project EXEC is expected to report project progress, activities and results to the DM and/or OGM on a periodic basis.

## **2.4 APR REVIEW COMMITTEE (APRRC)**

The APRRC consists of members from each service line and generally represent their respective division. APRRC members are selected by the SLD, in coordination with the DM. The SLDs chair the APRRC and coordinate efforts through the CDO. Members of the APRRC assist in the implementation of the Quality Program by:

- Partnering with the DM, SLD and ASLD to monitor the APR program in their respective service line;
- Monitoring the sufficiency of the number of APRs to serve their division's needs;
- Identifying potential APR candidates and assisting/overseeing their mentorship through the APR selection process;
- Participating in the APR evaluation and project review process;

- Supporting APR training;
- Identifying and assisting in remediation of any division/service line quality issues; and
- Serving as participants on the “committee” for the service lines to help lead and support standards development and quality initiatives

## 2.5 SERVICE LINE DIRECTOR (SLD)

The SLD is the senior professional within Terracon appointed to supervise the policies, practices, activities and lead innovation of the individual service lines. SLDs have specific responsibility to ensure that the quality management processes are being followed within their service line in all aspects as set forth in this PQM. They lead their respective group of ASLDs and APRRC members to oversee the quality processes. The SLDs work with the CDO to oversee the program across the company and provide necessary quality leadership, monitor the performance of the quality management program and make necessary modifications to the program and processes as the company evolves and needs arise.

The SLD is assisted in the execution of their responsibilities by ASLDs who serve an operating group-level responsibility. The ASLDs work closely with the SLD, the OGM, DM and the APRRC to maintain a vibrant and effective quality program.

SLDs have specific responsibility to assist in reviewing and approving specialized SMEs, as well as supporting ASLDs and the DM in the identification and assignment of the Project EXEC at the earliest stage possible for TYPE II projects. SLD's also may create specific practice guidelines, standards and quality management practices specific to the needs of their service line.

## 2.6 CHIEF DEVELOPMENT OFFICER (CDO)

The CDO reports directly to the President and is charged with monitoring the quality of our services, including the development and monitoring of the overall quality management processes. The CDO works with DMs, SLDs, and practitioners to continuously improve our quality of service to our clients and studies our current operations to explore and identify areas of necessary quality improvement as part of achieving our Strategic Plan vision, safety commitment, and prosperous growth imperative. The CDO co-chairs the ***Quality and Project Delivery Leadership Team (QPDLT)***, which is responsible for the implementation of project-level quality management and the quality processes that are defined herein to validate the performance of the quality program as well as identifying needed improvements.

## 2.7 OPERATIONS MANAGEMENT

Terracon incorporates several tiers of operations management into the project quality management processes as well as other significant functions related to project delivery and management responsibilities, including PM selection, PM development, project performance and other project success factors. The role descriptions listed below are only in relation to the quality aspects of their responsibilities.

### 2.7.1 Department Manager (DPM)

Department Managers have primary responsibility for the implementation, oversight, and success of the quality process within their department. DPMs from acquisitions should follow the acquisition quality integration process described in Appendix G, Section C. DPMs' specific responsibilities are:

- Recommending prospective Facilities and Materials DORs for approval by OM;
- Evaluating and approving qualified individuals in their department to be PMs in accordance with the [Terracon PM Selection and Approval Guidelines](#);
- Selecting the appropriate PM and APR for projects at the proposal stage based on type and complexity of the project and making sure the PM and APR are registered on the project in the ProjectXchange System;
- Considering projects being identified as TYPE II at the proposal stage and elevating the conversations for designation to the OM, ASLD and/or DM;
- Working with the PM so appropriate/qualified and licensed staff are assigned to projects and that the APR concurs with staff assignments;
- Partnering with the APR to oversee PM's performance;
- Financial performance of projects in their department (actual WU/WD to plan, invoicing, AR, WIP etc.);
- Partnering with the PM and APR to identify when an SME is necessary on the project and assist with the selection of the SME with the SLD and their representatives;
- Performing periodic site check-ins during field activities on projects to engage staff on safety issues;
- Reviewing deliverables by spot auditing project files to document APR review compliance;
- Attending and actively participating in the office quality "brown bag" continuing education meetings described in Appendix J;
- Being accountable for the approval of project scopes and project budgets within their department; and
- Serving as a quality champion, role model, and mentor, engaging with employees to understand the value and importance of quality as part of our Strategic Plan, safety culture, and on-time project delivery

### 2.7.2 Office Manager (OM)

Office Managers (OMs) are responsible for the implementation, oversight, and success of the quality process for all service lines within their office. OMs from acquisitions should follow the acquisition quality integration process described in Appendix G, Section C. OMs' specific responsibilities are:

- Approving DORs and posting and maintaining the list of approved DORs on **TerraNet** <https://terracon4.sharepoint.com/sites/Offices>;
- Recommending projects as Type II to the ASLD and DM when a project is of sufficient nature to warrant assignment of a Project EXEC;
- Ensuring that appropriate staff participates in required continuing education as set out in Appendix J;



- Conducting an annual “brown bag” style meeting for their DPMs, PMs, and APRs on the quality processes and best practices, with standardized training materials provided to OMs by the QPDLT as described in Appendix G, Section C;
- Ensuring office participation in the annual **PM/APR Survey** and sharing results, findings and information as it applies to their operation by communicating management expectations, and
- Serving as a quality champion, role model, and mentor, engaging with employees to understand the value and importance of quality as part of our Strategic Plan, safety culture, and on-time project delivery

### 2.7.3 Division Manager (DM)

Division Managers (DM) are responsible for the implementation, oversight and success of the quality management processes in their division. DM reinforce the importance of quality deliverables and project reviews in management communications to the same degree as financial performance. Their specific responsibilities are:

- Working with APRRC members to know and understand APR capabilities within the division and reinforcing the quality process within the division so it is properly executed;
- Working with APRRC members to identify new APR candidates to meet business needs;
- Working with SLDs and CDO on approval of new APRs;
- Partnering with the ASLD to confirm the identification of a potential TYPE II project and work with the PM, ASLD, DPM and OM in the selection of the Project EXEC;
- Reviewing the Division's **PM/APR Survey** with OMs and following up on results and findings as appropriate, with coaching, training, resources, etc. to ensure that improvements to the quality processes are being made;
- Serving as a quality champion, role model, and mentor, engaging with employees to understand the value and importance of quality as part of our Strategic Plan, safety culture, and on-time project delivery

### 2.7.4 Operating Group Manager (OGM)

Operating Group Managers (OGMs) are responsible for oversight of the DM's implementation of the quality management processes through:

- Observing and monitoring performance of the quality processes and giving periodic real-time feedback as to the effectiveness of the processes within the divisions;
- Providing DM with quality process improvement goals as needed;
- Reviewing the OG's **PM/APR Survey** with DMs and following up on results and findings as appropriate, with coaching, training, resources, etc. to ensure that improvements to quality processes are being made; and
- Serving as a quality champion, role model, and mentor, engaging with employees to understand the value and importance of quality as part of our Strategic Plan, safety culture, and on-time project delivery

### 2.7.5 All Practitioners

All employee-owners who touch our projects and clients bring their own expertise and curiosity to add value in our quality processes. From time to time, practitioners have the opportunity to review work (data, reports, etc.) that has been finalized for release in accordance with the provisions of the Project Quality Manual. A prominent example of such opportunity is in the case of National Account Managers.

In the course of their review, if the practitioner notes inconsistencies that, in the opinion of the practitioner, are of the level that require action, the practitioner should notify the APR of such inconsistencies. This notification should include the Assistant Service Line Director for the service line and region of responsibility.

## 3.0 PROJECT TYPES

This section explains the hierarchy of quality review based upon the project type and complexity. The common thread of all projects at Terracon is appropriate project oversight conducted by an APR.

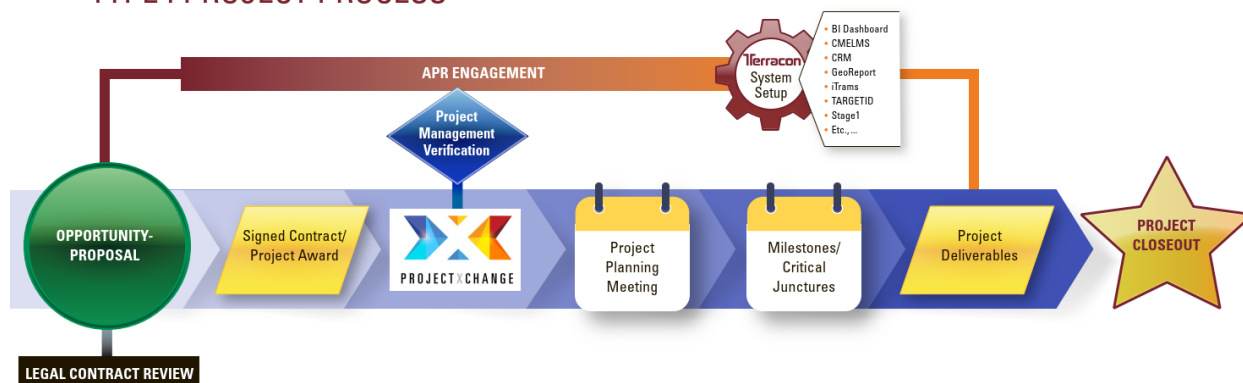
More specifically, Terracon has two types of projects based on the required level of oversight – TYPE I and TYPE II. TYPE I projects are standard Terracon projects, requiring APR assignment and execution as described in Section 3.1 below. TYPE II projects are generally larger, have more strategic visibility or risk potential, and/or are more complex and, as such, require a higher level of oversight. For that reason, while TYPE II projects require the same APR assignment and execution discussed above for TYPE I projects, they also require additional oversight by a Project EXEC as described in Section 3.2 below.

### 3.1 TYPE I PROJECTS

The quality process for Type I projects includes the full range of duties of the APR as described in Section 2.2 and execution requirements as set out in Section 4. The APR should be involved in the project from the proposal stage through completion of the project. Therefore, the PM shall notify the APR of their selection prior to registering the project to verify the APR's availability.

As stated, a TYPE I project is generally considered a “standard” Terracon project led by the PM with engagement and oversight by the APR. The TYPE I project process follows the quality expectations of this PQM as discussed in Section 4.

## TYPE I PROJECT PROCESS



### 3.2 TYPE II PROJECTS

For TYPE II Projects, the quality process is consistent with TYPE I projects with APR engagement and oversight with an elevated level of management provided by the Project EXEC as independent oversight, which is performed in addition to the review and oversight provided by the APR. The Project EXEC oversight does not replace the APR or relieve them of their duties but serves to enhance the process. Specific activities of Project EXEC oversight are outlined in Appendix N.3.

TYPE II projects are generally those that are very large in magnitude and/or have high risk or high opportunity. Project factors that could trigger a TYPE II project designation and the Project EXEC quality process are listed below. This list is not intended to be an exhaustive representation of factors that could require TYPE II project designation.

- **Financial Risk:** May include total construction cost, revenue generating capabilities of the finished project, potential repair costs, large subcontractor fees, potential liquidated damages, or risk of non-payment of significant Terracon fees. Examples may include:
  - More than \$100M total construction cost and Terracon has significant scope or scope involving high risk;
  - Large revenue generating facility with a potential for consequential damages and Terracon has a significant component of the scope for the facility
  - Contracted fees >\$1M for Materials and >\$500k for Environmental, Facilities & Geotechnical;
  - Combination of smaller projects under one contract with combined fees of \$500,000 or more
- **Project Staffing:** May include multiple office and/or service line teams as well as long duration, unique qualifications and experience or significant staffing requirements.
- **Technical Risk:** The work performed may have technical aspects that are on the periphery of Terracon's experience or availability of appropriate technical staff to deliver the work.
- **Client Value or Risk:** May include clients that are high value or high opportunity, as well as high risk or litigious clients.
- **Project Complexity:** May include technical complexity, multiple phases, strict regulation or contractual compliance requirements, safety or political sensitivity concerns.
- **Legal Risk:** May include high/no limitations of liability, lack of waiver of consequential damages, litigious market reputation, particularly in comparison to the Financial Risks discussed above.

In addition to the assignment of a Project EXEC to a TYPE II project, there are expanded management expectations and processes that focus on communication, collaboration, planning and oversight. The TYPE II Project Process is expected to be initiated as early in the project stages as possible, including the pursuit stage. The TYPE II Process is expected to be followed by PMs who have the responsibility to lead the process with support from the ASLD, Project EXEC and DM.

The TYPE II Proposal and Project Processes are summarized and included in [Appendix N.1](#).

## 4.0 PROJECT QUALITY PROCESSES

This section describes the quality processes for proposals and projects. [Appendix D](#) provides a graphical summary of the process.

### 4.1 PROJECT PROPOSALS

With the exception of projects in the Facilities and Materials service lines as noted in the paragraph below requiring Data-Only Deliverables, the APR should be assigned at the proposal stage, and proposals are to be reviewed by the APR. To the best extent practical, the same APR should be engaged from the proposal stage forward throughout the life of the project. Two signatures are required on all proposals to ensure review has taken place. One of those signatures must be an APR. By affixing their signature to the proposal, the APR attests that their responsibilities have been fulfilled.

For projects producing Data-Only Deliverables in the Facilities and Materials service lines, APR review is not required on proposals for projects not requiring professional opinions, conclusions or recommendations, unless fees exceed \$10,000. For such projects, the proposal may be authored or reviewed by either an OM or DPM without an APR oversight.

For TYPE II Projects requiring Project EXEC oversight, the Project EXEC should provide an independent review of the proposal. Confirmation of Project EXEC document review must be signified on the cover page of the proposal, but actual signatures from Project EXECs are not required.

Additional signature requirements are set out in [Risk Management Policy No. 8 - Authority to Sign Proposals and Contracts](#).

The APR must review the proposal to consider the following aspects of the project.

- Scope and technical approach;
- Client expectations;
- Project risk and risk mitigation strategies;
- Anticipated need for, and availability of, SMEs;
- Working with the PM to consider project as TYPE II with verification and confirmation by the ASLD and DM;
- Ability to achieve the schedule for on-time delivery with sufficient consideration for quality;

- Budget review for work items, hours, contingency, pricing, and proper allocation to each budget/task category in PX, etc.;
- Scope definition to confirm clarity of Terracon's commitment;
- Assumptions associated with pricing and how the assumptions are stated within the proposal; and
- Precision of scope and that all exclusions are stated clearly

## 4.2 **PROJECT EXECUTION**

In the event the APR who reviewed the project proposal is unavailable to serve as APR for the project, the PM should consult with the DPM to select an alternate APR. The PM should notify the selected APR and confirm their availability to serve as APR for the remainder of the project before changing the assignment within PX.

The PM should establish that a contract is developed for the conduct of work consistent with [Terracon's Risk Management Policies](#) and the APR should confirm that such contract is in place.

The following sections outline the Project Execution requirements for all projects.

### 4.2.1 **Project Kick-Off Meeting**

The kick-off meeting is an important opportunity to engage with our clients, explore and understand their needs, and learn how we can create a great client experience and build these relationships.

Consistent with the commencement of the project, the PM shall schedule a project kick-off meeting with ample time and with appropriate parties, including the APR, to affect the initiation of a successful project. The APR has the responsibility to make sure the PM conducts the kick-off meeting and communicates clearly the elements that will result in project success, including safety, scope, schedule, quality, budget, risk and client satisfaction. If the APR is not physically present in the office where the kick-off meeting occurs, the APR should attend via video conferencing to allow the APRs full engagement. During the kick-off meeting, the APR and PM shall mutually agree on critical junctures and the desired level of engagement. The kick-off meeting shall also be used to establish the parameters that will bring about project success from safety, client satisfaction and financial perspectives. In the case of a need for an independent SME(s) or a Project EXEC to support the project, they shall also be included in the kick-off meeting.

For TYPE II projects, the Project Management Plan (PMP) should be completed, presented and discussed in detail with all Project Team Members in the Project Kickoff Meeting.

Separate, Client-Engaged Project Kick-Off Meetings are encouraged whenever possible. Such meetings should be initiated by the PM, and they should include the PM, the APR, the client and design team professionals.



### 4.2.2 Critical Junctures

Critical junctures create opportunities for the APR to monitor the project status, to verify the assumptions in the scope, schedule and budget, to consider the need for SMEs, and to validate with the PM that the project is progressing as planned. APR and PM interaction at each defined critical juncture is essential. If critical juncture meetings are not taking place, the APR, DPM and OM will develop a corrective action plan for the PM, which will include a client communication plan for any scope and/or budget adjustments requiring a signed change order before any extra work is begun.

Mandatory critical junctures include:

- Proposal submission,
- Project kick-off meeting,
- Preparation of change orders,
- Deliverable reviews, and
- Project closeout

Additional critical junctures may be deemed necessary by the APR based on criteria such as project risk, experience of the project team, client, and technical difficulty. In addition, the Project EXEC may elect to participate in certain critical junctures as set forth in the **PMP**. Other critical junctures may include, but are not limited to, the following:

- Project team meetings;
- Characterization and calculations;
- Preliminary findings, opinions, recommendations or conclusions;
- Preliminary document outlines formation;
- Client communication preparation, including verbal and e-mail and Client Portal submittals, which convey opinions, recommendations, and/or conclusions

Whenever possible, these critical junctures should include interim deliverables to the client and their design team professionals to facilitate collaboration. In addition to critical junctures established at the Project Proposal stage, certain events during the project execution may arise, which create critical junctures, not originally anticipated at the Project Planning stage.

Examples of such unanticipated events include, but are not limited to:

- Safety-related incidents, including near-miss and actual incidents of any type;
- Unanticipated conditions related to project findings with potential to affect project scope, schedule and/or budget or client expectations;
- Unexpected delays of any type affecting project schedule;
- Client interaction changing work scope or schedule;
- Reassignment of PM, APR or other key staff

The APR must be involved at critical junctures during the course of the project for consultation, guidance, and coaching.

### 4.2.3 Document Review

As noted above, any and all client communication (documents, email, verbal), except data reports without conclusions, recommendations or opinions, constitute a critical juncture unless

the communication is clearly defined as preliminary and subject to modification. The APR must review and approve all final deliverables. APRs must examine the technical approach, validity of assumptions, verification of data and analysis and the overall compliance of the deliverables within Terracon standards (format, grammar, punctuation, consistency and alignment of deliverable contents with correct table of contents and other aspects of the 'written quality' of the deliverables) as well as confirming that the deliverables are aligned with the scope as defined in the proposal.

The APR and PM shall strive to schedule and coordinate the preparation of project deliverables to allow the APR and SME adequate time to perform the required functions. The APR expects sufficient lead time for reviewing the draft of the final deliverable. The PM is expected to provide the deliverables to the APR in a final form ready for client delivery. Likewise, the SME needs adequate time to be engaged in the project in such a way that they can provide input in a timely manner up through and including reviewing portions of the project deliverables related to their area of involvement.

The APR shall confirm that project deliverables:

- Provide appropriate opinions, recommendations, and/or conclusions that align with client needs and project risks and that all such opinions, recommendations and/or conclusions are supported by the data;
- Satisfy contractual obligations and client-specific requirements;
- Incorporate appropriate risk management elements;
- Satisfy pertinent statutory requirements;
- Correlate with information and findings contained in other Terracon services impacting the project site;
- Follow Terracon guidelines and formats for the particular services; and
- Satisfy project-specific QC plans

As a subset of the APR responsibilities, where an SME has been engaged, the APR must clearly define the areas of responsibility of the SME so that they can provide adequate support to the project.

The APR shall also verify the PM is effectively consulting with the client regarding project recommendations contained within the deliverables. The communications should occur in a manner in which the client clearly recognizes and understands the recommendations.

#### 4.2.4 Data-Only Review

Certain deliverables in the Materials and Facilities service lines are "Data-Only", meaning that the deliverable contains field, laboratory, observation or test data only and does not contain an opinion, recommendation, or conclusion. In those instances, the DOR is a formal designation for individuals who are qualified and approved to review factual data. Offices maintain lists of qualified DORs for Facilities and Materials for reviewing **Data-Only Deliverables**. The role of the APR on a data review will vary depending upon the complexity of the project. The APR may review some of the deliverables; however, at a minimum, the APR will provide coaching and technical oversight to the DOR and periodic review of representative deliverables. Specific data review activities are outlined in detail in [Appendix E](#) – Data-Only Review Project Checklist.

Further data review activities applying specifically to Materials and Facilities services are outlined in [Appendix F](#).

#### **4.2.5 Real-Time Data Delivery**

In many instances, Terracon may establish means to share data collected in the conduct of a project with the client, design team professionals, and/or other project team stakeholders in real-time, or as the data is collected. The specific criterion that such data must meet to be delivered real-time is: Such data are representative of a condition at a point in time and cannot be modified subsequent to the collection of the data, with exception of location errors. When this criterion is met, the specific data to be delivered real-time must be developed using quality processes that anticipate the delivery of such data in real-time, including the knowledge and experience of any individual that may apply engineering judgement in the context of real-time delivery. The APR must confirm that such processes are in place before real-time data delivery can proceed. From time to time specific, routine opinions or engineering judgement related to the real-time data can be delivered in association with the actual data. In such cases, any opinions must be specifically identified as preliminary, and subject to change upon completion of Terracon's quality processes. In any case where specific and routine opinions are delivered in association with the real-time data, the APR must approve the specific process that is in place to deliver such opinions.

#### **4.2.6 Signature Requirements**

The PM and APR must co-sign any project deliverables containing opinions, recommendations, and/or conclusions, unless the deliverable is clearly identified as preliminary and subject to change. If there are licensing or certification requirements by a state, agency, or client that must be met, either one signer or the combination of the two signers must jointly satisfy all requirements, including sealing the documents with a professional seal. If the PM is an APR, any project deliverable must be reviewed and signed by a second person who is considered to be capable of rendering a competent, critical review consistent with the complexity of the project. The second reviewer shall be selected by the DPM. The second reviewer is not required but should be an APR, if at all possible, and should not be a subordinate to the PM on the project. In any event, the deliverable must be signed by an APR, either as author (first signature) or reviewer (second signature). Two signatures are required on all deliverables, unless the deliverable is specifically noted as preliminary and subject to revision based upon final review.

##### **4.2.5.1 Hard-Copy Documents**

Original signatures are preferred for hard-copy documents. Unless a statute or the client requires original signatures, APRs or authors may authorize another person to sign on their behalf. The procedure for proxy signatures for an APR shall be for the individual authorized to sign on behalf of the APR to sign their own name and add below "for [APR's NAME]" to refer to the APR.



#### 4.2.5.2 Electronic Documents

Deliverables are generally issued in PDF format or delivered via our Client Portal Website, email or other document management system required by our clients. When delivering electronic documents outside the Client Portal, it is required that the deliverables utilize electronically affixed signatures that can be digitally verified if needed. This occurs through the use of Terracon's required secured digital signature program, **TerraSign**, or Terracon's approved electronic signature platform, **Adobe Sign**, in accordance with [Terracon Risk Management Policy No. 12](#).

As an alternative, the deliverable can be signed with "wet ink" and scanned into PDF format for distribution to the client and followed by a hard copy to the client. The PM shall confirm that electronic deliverables follow Terracon policies and procedures for digital signatures and are consistent with state requirements for electronic reporting or digital signatures.

#### 4.2.5.3 E-mail, Client Portal and Other Communications

E-mail, client portal and other communications containing opinions, recommendations, and/or conclusions must be reviewed consistent with this manual and must document an APR review. To document, include "Reviewed by [APR's NAME]" in the closing of the e-mail, and copy the APR on the e-mail.

The only exception to this requirement is related to specific electronic communications that are designated as preliminary and subject to subsequent revision.

### 4.3 PROJECT CLOSEOUT

Upon completion of the project, the APR shall meet with the PM and conduct a Project Closeout Meeting. If the project is identified as a TYPE II, the Project Closeout and Project Closeout Meeting should follow expectations of the PMP (Appendix N.4).

The Project Closeout Meeting is to review the parameters as established in the Kick-Off Meeting that defined safety, client satisfaction and financial success and to assess whether all parameters were met. The APR may require the DPM to attend the Project Closeout Meeting. When unusual experiences are noted, the APR and PM should use the opportunity to document any lessons learned for the continued development of the PM and to keep the DPM apprised of any pertinent items. Meetings focused on continuous improvement should include developing lessons learned, which may also be helpful in evaluating potential "systemic" issues within the safety, quality and project delivery processes.

Additionally, The PM should update their resume and prepare project capsules for future proposals that would benefit from the experience gained during the project.

Items to be discussed in the Project Closeout stage include the following:

### 4.3.1 Records Management

At Project Closeout, the PM shall properly close the project files and documents (email communications, photos, financial documents, etc.) according to Terracon's Records Management Policy, with confirmation by the APR. When applicable, the PM shall also collect underlying electronic files (i.e. CADD) from other offices that performed work on the project and place in appropriate project files.

### 4.3.2 Technical Success

The APR is encouraged to engage the PM in a conversation with the client and other project team members to gauge their opinions related to the success of the project. This offers an excellent opportunity for the APR to coach the PM to build client communication skills as well as to improve upon our ability to meet particular client needs. Upon completion of the client conversation, the APR and PM should consider ways to improve their processes as a part of the Continuous Improvement philosophy. In conclusion, the APR and PM shall update their resumes and write project capsules describing the project and its success for future client development opportunities.

### 4.3.3 Financial Success

The APR must review the success of the project from a financial perspective. They should consider whether the project met the budget, the planned WU/WD expectations and the client's expectations. If variations are discovered, the APR shall discuss the root causes of the unplanned WU/WDs, with the PM and document how to prevent such occurrences in the future as a part of the Continuous Improvement philosophy.

## 5.0 PROGRAM COMPLIANCE

Regular examination of the quality management processes is essential to ensure the processes are being implemented and executed consistent with this manual and its objectives.

The QPDLT will conduct an annual survey regarding the quality process and its implementation. Separate surveys will be sent to APRs and PMs to obtain numerical feedback ratings and open-ended question responses on the quality process and its implementation from the specific perspective of each audience. Survey participants will be invited to raise specific concerns and to suggest ideas for improvement.

The CDO or their designee will compile and present an annual report for the Executive Committee to provide a status report outlining the progress of Quality and Project Delivery efforts. The report will include:

- Information such as the number of APRs approved during the year for each division by service line and the estimate of how many are expected to go through the approval process the following year.
- Summary of the annual APR/PM Survey;
- APR training (what was taught and how many were trained) and training approach for the following year;

- Refinements made to any quality process;
- PX initiative accomplishments and what updates are expected the following year.
- Number of APRs evaluated and any significant modifications to the evaluation process or trends/results; and
- Progress made on any additional initiatives assigned by Executive Committee at the beginning of the year

## 6.0 DOCUMENT CHANGES

Continued development and improvement of quality processes and procedures are a critical part of a functioning and effective quality program. It is expected that some modifications to supporting documents, forms and templates, including clarification of defined processes and procedures may be needed from time to time. Therefore, changes to the PQM document may be defined as follows:

- **Major changes** – Changes to the PQM document, other than those defined as minor changes, are considered major changes and shall be reviewed by the **QPDLT** and approved by the **Executive Committee**.
- **Minor changes** – Minor changes to documents that do not impact the original intent, such as editorial corrections, clarifications, modifications to forms, tables, templates and other attachments shall not require that the revised documents receive the same review and approval as the original documents. To avoid a possible omission of a required review, the type of minor changes that do not require such a review and approval shall be authorized by the **CDO** and documented as a minor revision, accordingly, on the **Revision Record**.

## Appendix A

### Definitions

The following terms are bolded and italicized on first reference in this manual. Their definitions are:

***AdobeSign*** is Terracon's electronic signature platform which may be used for signing contracts, proposals, offer letters, lien waivers and invoices, among other documents. Adobe Sign should not be used to sign documents which require a seal, reports, or when clients require digital signature use for uploading to their systems. In those instances, TerraSign should be utilized.

***Annual Project Quality Report*** is compiled by the DQPD on an annual basis to provide review process compliance information to management personnel.

***Acquisition APR*** is a senior professional who is a member of an acquired firm and has been identified by the DM and SLD as qualified to perform the quality functions for projects in accordance with the acquired firm's quality processes. The use of the term 'Acquisition APR' and person selected as the project quality manager can function in this role until the candidate has become an APR using Terracon's processes. Time limits of the use of the Acquisition APR for projects are to be agreed upon by the SLD, DM and senior members of the acquired firm, but not to exceed two years from the date of acquisition.

***Authorized Project Reviewer (APR)*** is a senior professional within Terracon who has been recognized in their service line as capable and qualified to provide project oversight as set out in this manual.

***APR Program Administrator (APRPA)*** reports directly to the Chief Legal Officer and is responsible for administering the APR application process from nomination through approval in addition to maintaining APR electronic files, updating the Quality page on TerraNet, and assisting APRs, Service Line Directors, ASLDs, APRRC, QPDLT members with any APR-related assignments, questions, or concerns.

***APR Review Committee (APRRC)*** is a committee made up of senior APRs (representing each division and service line) appointed by Service Line Directors in conjunction with Division Managers. Their responsibilities are to identify potential APR candidates and mentor them through the APR selection process, participate in evaluating the performance of existing APRs, support and lead APR training at the division level, identify and assist in remediation of any division/service line quality issues, and serve as a "committee" for the service lines to help lead and support any quality initiatives that may occur.

***Assistant Service Line Director (ASLD)*** supports the SLD to supervise the policies, practices, activities and lead innovation of the individual service lines. ASLDs serve at an operating group-level of responsibility. The ASLDs work closely with the SLD, the OGM, DM and the APRRC to work with operations to manage and maintain the quality program.

***Chief Development Officer (CDO)*** reports directly to the President and is responsible for continually monitoring the quality of our services and is responsible for developing and monitoring the Quality Program and the review processes of this manual. The CDO may approve MINOR changes to the PQM for release to operations.

***Client-Engaged Kick-Off Meetings*** – Project kickoff meeting that includes the key client representatives to improve project execution, establish milestones important to the client, and unify the project team and include an introduction to the Client Portal. Topics to be discussed during the client kickoff meeting include site specific safety considerations, schedules and communication, project understanding, scope and change order management, and milestones/delivery preferences.

***Contract Authority*** - Terracon has adopted authority levels for signing contracts and proposals defined in [Risk Management Policy No. 8](#). With the grant of authority comes the requirement to independently assess the risks and rewards of the project to ensure that it is in the best interests of Terracon to perform the services under the scope and terms outlined in the contract prior to signing the proposal or contract.

***Critical Junctures*** are clearly defined points in time in the life of the project when the APR and the PM meet to discuss project progress. Critical Junctures should be defined at the outset of each project.

**Data-Only Deliverables** are associated with a Type I project in either the Materials or Facilities service line, which do not include opinions, conclusions or recommendations.

**Data-Only Reviewer (DOR)** is an individual assigned to do a data review on any given project. For Materials Service Line projects, the Data-Reviewer is approved by the Office Manager and authorized to review project deliverables or tasks relating to field and laboratory observations and test data collection only that do not contain opinions, recommendations, or conclusions.—A list of qualified Data Reviewers for each office is posted on TerraNet/Offices/[Office Name] for Materials Service Line projects only.

**Kick-Off Meeting** is a required meeting that takes place at the beginning of a project to establish the project goals and to confirm that the project team understands those goals, including project schedule, budget, safety plans, quality guidelines, communication plans, critical junctures, etc. The meeting should be run by the Project Manager with the APR and all project team members in attendance. If the APR is remote, they should attend via video conference to ensure engagement and consensus between the APR and PM.

**Office Manager (OM)** includes both Office Managers and Regional Managers with Office Manager responsibilities over a specific office.

**PM/APR Survey** is an annual survey of APRs and PMs on the execution and office culture associated with Terracon's quality processes.

**Project Executive (Project EXEC)** is a senior professional designated by the ASLD in collaboration with the Division Manager. Project EXEC has oversight responsibility on TYPE II projects in partnership with the APR.

**Project Manager (PM)** is a technical professional within Terracon who is responsible for overall quality, product delivery, and client service of projects they manage.

**Project Management Plan (PMP)** is a document prepared by the PM and approved by the Project EXEC for TYPE II Projects. The Project Management Plan lists all responsible parties within Terracon as well as other project partners, and the individual responsibility of each, includes a communication plan and a definition of project success.

**ProjectXchange System (PX)** is an electronic, company-wide enterprise data entry system for registering projects and specific project information; used in managing the project and providing overall data for wider analysis of common issues or trends.

**Quality Control (QC)** consists of the procedures and practices established for executing Terracon's services to achieve quality objectives. This means establishing those measurements (i.e., standards, specifications, or criteria) and then controlling, monitoring, or measuring the services performed through checks, tests, or confirmations so that quality objectives are met.

**Quality Assurance (QA)** is the assessment process of reviewing, monitoring, and auditing to verify that quality control procedures and practices are fully incorporated and are meeting quality objectives.

**Quality Program** summarizes Terracon's overall approach, policies, and procedures relating to quality and is formally documented in the Quality Program Manual.

**Quality and Project Delivery Leadership Team (QPDLT)** is a committee appointed by the Executive Committee to oversee Terracon's Quality and Project Delivery Program. The committee is co-chaired by the CDO and the CLO, and includes the President, Service Line Directors, CFO, CIO, Director of EDW, and representative members from the respective service lines and operating groups.

**Quality Management System (QMS)** is the organizational structure, staff, responsibilities, policies, standard operating procedures, processes, and records that assist in achieving its quality objectives of Terracon's field and laboratory testing services.

**Risk Management Policies** are the policies enacted by the Executive Committee to control and manage the risks and exposures related to our services.

**Service Line Director (SLD)** is the senior technical professional within Terracon administering the policies, practices, and activities and leading quality, consistency and innovation within the various service lines.



**Subject Matter Expert (SME)** is an individual, as determined by the Service Line Director, who possesses specific technical experience and expertise in a particular technical field associated with the execution of a project.

**TerraNet** is Terracon's electronic intranet, supplying valuable information, policies, and procedures to our employees in an easily accessible format and access to the service line and office sites.

**TerraSign** is Terracon's digital signature system allowing professionals to provide digital signatures and stamps to project deliverables.

**TYPE I Projects** are those projects that are assigned an APR without a Project EXEC.

**TYPE II Projects** are those that, as determined by the ASLD in collaboration with the Division Manager, carry significant investment by our clients, represent a unique challenge for Terracon or significant risk to (or opportunity for) Terracon and require a Project EXEC review. See Section 3.2 for general criteria for TYPE II Projects.



## Appendix B

### Project Quality Duties and Responsibilities

| Role                                                                                                                                                                                                                                                                                                                                                                     | Primary            | Oversight                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|----------------------------|
| Perform project services consistent with company methods, practices, and core values.                                                                                                                                                                                                                                                                                    | All Staff          | OM                         |
| Review Materials or Facilities projects deliverables or tasks relating to field and laboratory observations and test data collection that do not contain opinions, recommendations, or conclusions for projects of \$10K or less.<br>Confirm collection of field and laboratory data consistent with provisions set forth in Quality Management System for all projects. | Data-Only Reviewer | OM, DPM or APR             |
| <i>Project Success.</i><br>Considering all safety, technical quality, product delivery, client service, employee engagement and financial aspects of project.                                                                                                                                                                                                            | PM                 | DPM<br>APR<br>Project EXEC |
| APR assignment for projects containing deliverables with opinions, recommendations, or conclusions. Work with the PM to ensure that qualified staff is assigned to the project.                                                                                                                                                                                          | DPM                | OM                         |
| Confirm proper technical oversight of PM, using SMEs when deemed necessary. Provide guidance, coaching and review of project execution including adherence to safety rules and practices, scope, schedule and budget. Provide documented review of final correspondence containing opinions, conclusions, or recommendations.                                            | APR                | APRRC<br>Project EXEC      |
| Define Type II Projects requiring Project Executive. Select Project Executive for Type II Projects.                                                                                                                                                                                                                                                                      | ASLD               | DM                         |
| Represent service lines and divisions to identify and mentor APR candidates and review standing APRs. Support/lead APR training at the division level. Serve as a "committee" for the service lines leading quality initiatives                                                                                                                                          | APRRC              | ASLD<br>SLD                |
| Implement corporate policies and systems necessary to achieve project quality at the office level                                                                                                                                                                                                                                                                        | OM                 | DM                         |
| Promote and enforce PQM and all referenced policies and procedures. Maintain adequate APR staffing and confirm consistent training program. Assumes responsibility, authority, and accountability for quality of projects within Division.                                                                                                                               | DM                 | OGM                        |
| Develop and monitor Quality Program and recommends continuous improvements.                                                                                                                                                                                                                                                                                              | SLD                | CDO                        |
| Set corporate philosophy regarding Quality and Project Delivery.<br>Promotes attitudes, processes, and procedures necessary to achieve quality and project success.                                                                                                                                                                                                      | QPDLT              | EXCOM                      |

This table summarizes Duties and Responsibilities of the various staff that will be engaged with a project. More details regarding the Levels of Quality Control are provided in Appendix C.

## Appendix C Quality Control Tiers

| Quality Tier                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Project Type                                                                                                                                                                                                           | Description and Documentation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>DOR</b> (Data-Only Reviewer)                                                                                                                                                                                        | <b>Assigned by DPM, Approved by OM</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Project deliverables for Materials or Facilities SL and tasks for all SLs providing field and laboratory observations and test data collection. Deliverables do not include opinions, recommendations, or conclusions. | <ul style="list-style-type: none"> <li>(a) Data collection, calculation and reporting in conformance with QMS</li> <li>(b) Independent check of field and laboratory observations, data and calculations.</li> <li>(c) Documentation by initials and dates on deliverables.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>APR</b> (Authorized Project Reviewer)                                                                                                                                                                               | <b>Assigned by DPM</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Projects where opinions, recommendations, or conclusions are provided.                                                                                                                                                 | <p>Confirm data review responsibilities noted above, plus:</p> <ul style="list-style-type: none"> <li>(a) APR review of proposals, procedures, calculations and final submittals to assure data quality, data interpretation, analytical methods, calculations, results, opinions, recommendations, and conclusions.</li> <li>(b) Attends Project Kick-Off and Critical Juncture meetings to coach PMs on aspects of project including client relationship, safety, scope, schedule, budget and technical review of deliverables.</li> <li>(c) Based upon complexity of projects, assigns SMEs when deemed necessary by the APR. Document by signature of APR on project deliverables.</li> <li>(d) Assigns independent SMEs when deemed necessary.</li> <li>(e) Signs all final documentation and is copied on all electronic deliverables with appropriate documentation.</li> </ul> |



## Project EXEC (Project Executive)

### Assigned by ASLD in Collaboration with DM

#### TYPE II Projects.

A TYPE II Project is confirmed by the ASLD in collaboration with the DM based upon their judgment of size, scope, risk or opportunity.

Confirm APR responsibilities noted above, plus:

- (a) Independent project review.
- (b) Review and approve Project Management Plan.
- (c) On unique technical projects, independent review of APR's selection of SMEs, confirming proper technical contribution from SMEs within or outside the company.
- (d) Oversees project execution including client relationship and risk management, meeting budget and schedule, staffing, and overall successful delivery of the project
- (e) Confirms proper signature/documentation of APR.

## Appendix D Project Review Process

| Data-Only Projects                               |                                                                                  | All Others<br>(including Type II Projects as defined in Appendix A)                                                                                                                                                                                                                                            |
|--------------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Project Planning</b>                          |                                                                                  |                                                                                                                                                                                                                                                                                                                |
| Proposal/Contract                                | One Signature Required<br>DOR, APR, Dept. Mgr. or OM.                            | Two Signatures Required, APR must be one<br>Type II Projects: include & acknowledge <b>Project EXEC Oversight</b><br>Additional signature requirements are set out in <b>Risk Management Policy No. 8 – Authority to Sign Proposals and Contracts</b>                                                          |
| <b>Project Execution &amp; Document Delivery</b> |                                                                                  |                                                                                                                                                                                                                                                                                                                |
| Project Kick-Off Meeting                         | Part of weekly staff meeting                                                     | Participants: APR/PM & Other Key Members (as designated by PM)<br>TYPE II Projects should include <b>Project EXEC</b><br>Define Project Team, including PM, APR, SMEs, Project EXEC,<br>Establish Parameters for Success, Critical Junctures, Scope, schedule, budget, quality, safety and client expectations |
| Critical Junctures                               | N/A                                                                              | Critical Juncture (CJ) meetings held as specified in Kick-Off meeting<br>APR/PM attend all CJ Meetings. SMEs attend as defined by APR.<br><b>Project EXEC</b> attend specified CJ Meetings for TYPE II Projects                                                                                                |
| Project Deliverables                             | One Signature Required<br>DOR, APR, DPM. or OM                                   | PM and APR Signature<br>If PM is the project APR, add signature by independent reviewer<br>Project EXEC Review for TYPE II Projects<br>Project EXEC Oversight acknowledged on signature page                                                                                                                   |
| <b>Project Closeout</b>                          |                                                                                  |                                                                                                                                                                                                                                                                                                                |
| Records Management                               | PM verifies file maintenance consistent with Terracon's Records Retention Policy |                                                                                                                                                                                                                                                                                                                |
| Technical Success                                | PM confirm client satisfaction                                                   | PM/APR review compliance with scope/schedule<br>Include Project EXEC for TYPE II Projects<br>Hold Continuous Improvement Meeting for unique projects                                                                                                                                                           |
| Financial Success                                | PM confirm Financial Parameters, Invoicing and Collection                        | PM confirm Financial Parameters, Invoicing and Collection<br>APR confirm compliance with budget and WU/WD Projection<br>Hold Continuous Improvement Meeting for unique projects                                                                                                                                |

Note: TYPE II projects, shall be conducted under the direction of a Project Management Plan reviewed and approved by the Project EXEC.

### Important Notes about Safety:

*Safety is integral to everything that we do. APRs and PMs have unique and specific responsibilities related to project safety.*

PMs are responsible for establishing safety protocols throughout the life of the project consistent with Terracon's Core Safety Rules and Practices and Life Safety Absolutes as well as any project specific safety requirements.

APRs are responsible to coach the project team to complete all phases of the project safely, consistent with Terracon's Core Safety Rules and Practices as well as any project specific safety requirements.

The scope of safety-related responsibilities is beyond the scope of this document. Project-Specific Safety planning and Safe and Right Procedure Certification requirements provide more details.

## Appendix E

### Data-Only Review Project Checklist

#### DATA-ONLY REVIEW PROJECT CHECKLIST

Following checklist is provided to assist the Data-Only Reviewer (DOR) during the project deliverable review process. Not all points are mandatory to follow; however, each should be appropriately considered based upon project requirements.

The DOR should review the project scope and ascertain whether they are familiar with the scope of services required for the project. If the scope of services for the project is outside the traditional experience of the DOR, the project should be directly reviewed by another DOR or an APR. Special projects, such as forensic studies and projects with high inherent risk should be directly reviewed by an APR. If significant issues arise or if opinions, recommendations, or conclusions are provided during the project, the DOR should immediately involve the APR.

#### Project Document and Data Review

- ☐ Are appropriate template formats used?
- ☐ Does deliverable adhere to proposal scope or signed contract?
- ☐ Are project specifications available for review?
- ☐ Are data and calculations being reviewed?
- ☐ Are data and calculations being reviewed by senior personnel or APR, if necessary?
- ☐ Is correct grammar and language being used?
- ☐ Are field data and results consistent with final deliverable?
- ☐ For Materials services, are deviation logs being maintained daily, and deviations communicated to client and other parties within 24 hours?
- ☐ Are deliverables being distributed to client in required time frame?
- ☐ Are opinions, recommendations, or conclusions provided? If yes, is an APR reviewing the deliverables?
- ☐ Is DOR discussing quality of deliverables with APR on a regular basis?

## Appendix F

### Project Quality Review Responsibilities For Materials Services

#### PROJECT QUALITY REVIEW RESPONSIBILITIES FOR MATERIALS SERVICES

The services that Terracon provides on a significant majority of our projects in the Materials Service Line involve performing field and laboratory observations, testing, and data collection. On many Materials projects, we may not be required or requested to provide opinions, recommendations, or conclusions at any point during the project. The PQM defines project deliverables or tasks related to providing field and laboratory observations and test data collection and not containing opinions, recommendations, or conclusions as a Data-Only Review process (see [Section 4.2.4](#) of this manual). However, this does not remove the requirement of having an APR assigned and involved in each Materials project. The PQM requires that an APR be assigned to each project, regardless of complexity or services to be provided. Project personnel must have a clear understanding of the role of the APR on Materials projects. In the case that a project does not have opinions, recommendations or conclusions, but requires an APR, the APR is not required to have a Professional Engineer's license. Materials Service Line has provisions for the non-PE APR, as shown in the APR applications. In the event a project evolves to include recommendations and opinions, the non-PE APR shall seek review by an appropriately-skilled PE, preferably with APR status.

As discussed above, a DOR can be assigned to do the quality review on many of the deliverables on Materials projects. This is often more practical and efficient due to the volume of Materials projects and associated reports in an office. However, any project deliverable that contains opinions, recommendations, and/or conclusions must be reviewed by the APR prior to client submission. If the APR is not a licensed Professional Engineer in the state that the services were performed, the primary author needs to be a licensed Professional Engineer in the applicable state.

The following table provides additional guidance for review responsibilities for various types of project deliverables on Materials projects. This report is not an exhaustive listing of every type of Materials report. If questions arise on a Materials project as to the necessary level of review required, the PM should consult with the APR.

## Reviewer Requirements for Various Materials Reports

| Minimum Required Reviewer                                                                                                                                                                                                                                                                                                | Materials Report Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>DOR that meets client and local jurisdictional review and signature requirements</p> <p>Note: Expectations for report content and review need to be discussed, clarified and set in the kickoff meeting with the APR</p>                                                                                              | <ul style="list-style-type: none"> <li>Report of laboratory test results</li> <li>Report of Field Observation, Inspection and/or Testing services that strictly reports test results and results of observations and inspections and state acceptability or compliance only (contain no opinions or recommendations), with exception of those noted below. The experience and qualifications/certifications of the field personnel performing the testing, observations, and inspections contained in the reports must be appropriate and current for the service being performed and reported.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <p>DOR with either the author or reviewer having specific additional expertise and certification/license; meet client and local jurisdictional review and signature requirements</p> <p>Note: Expectations for report content and review need to be discussed, clarified and set in the kickoff meeting with the APR</p> | <ul style="list-style-type: none"> <li>Structural Steel Reports – DOR must be a CWI, ASNT LEVEL II, or a Professional Engineer</li> <li>Roofing Observation Reports – DOR must be an RRO, RRC, or a Professional Engineer</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <p>APR with professional license, or Registered Professional Engineer that meets client and local jurisdictional review and signature requirements</p> <p>Note: Expectations for report content and review need to be discussed, clarified and set in the kickoff meeting with the APR</p>                               | <ul style="list-style-type: none"> <li>Certification/Verification/Confirmation Letters</li> <li>Interim and Final Letters required by client or local jurisdiction for Certificates of Occupancy (COs)</li> <li>Report of Field Observation, Inspection, and/or Testing that also includes opinions, recommendations, and conclusions (e.g., proof rolling, foundation bearing capacity, load tests, review of weld procedures, etc.). The experience and qualifications/certifications of the field personnel performing the testing, observations, and inspections contained in the reports must be appropriate and current for the service being performed and reported.</li> <li>Review, Verification, or Design of Concrete/Grout/Asphalt Mixes</li> <li>Verify that Materials QMS is being implemented</li> <li>Consults regarding failing tests, trends, and problems, in addition to providing solutions and remedial actions, e.g., proof rolls that fail and Terracon recommends aeration, removal and replacement, chemical stabilization, or other remedies</li> <li>Statistical analysis of test results to evaluate acceptability or compliance</li> <li>Reports related to the investigation, evaluation, or forensic study of existing structures and or in-place materials</li> </ul> |

- Subcontracted services which contain engineering opinions, judgment, recommendations, or conclusions.



## Appendix G

### PM and APR Appointment and Review

## PM AND APR APPOINTMENT AND REVIEW

The PM and the APR roles provide the foundation of our quality program, and it is critical that only experienced and qualified PMs and APRs be appointed. Terracon is continuing to build upon our PM training, appointment and review process. PMs are assessed for appointment as part of their hiring or promotion process by the hiring team.

### **A. PM SELECTION, TRAINING AND APPROVAL**

Candidates to be PMs must have at least two years of professional experience in our industry and must complete designated training and demonstrate proficiency in the use of Terracon systems and tools, as well as exhibit competency in selected skills. PM candidates are required to complete the [Terracon PM Selection](#) process. Approval to the role of PM is made by the DPM or OM for personnel assigned to operations offices or the supervising Sector/Service Line/Operations Director for personnel assigned to operations development

Once an employee has met the requirements to become a PM and approved as such, it will remain the responsibility of the employee, their direct supervisor and the APRs they work with on their projects to continue development and training. The PMs supervisor should assign projects to PMs based on their experience, knowledge, abilities, and continued growth in varying complexities and size of projects.

The expectation of this role is continuous improvement, fundamental competence and eventual mastery in project management, and the ability to consistently meet project quality, safety, financial, and on-time delivery expectations and a successful client experience.

Only PMs that have met all the PM expectations and has consistently shown their ability to successfully manage a wider array of Type I projects of varying size and complexity and successfully completing tasks can the individual qualify to be assigned to the PM role on Type II projects. Type II projects are required to be managed by PMs that are accepted by the assigned Project EXEC.

### **B. REQUIRED STEPS FOR APR APPOINTMENT AND REVIEW**

A fundamental aspect of maintaining quality is the process of identifying, appointing and reviewing APRs. APRs must possess a broad base of experience in their respective technical field and must also be well-versed in project management, quality and risk management matters. APRs must demonstrate excellence, integrity, and curiosity in technical, business and 'interpersonal' skills to be able to bring their influence and expertise to their assigned projects. APRs must be intimately familiar with, and supportive of, Terracon's standards for project execution and project delivery.

APR candidates should have ten years of professional experience and five years of management or supervisory experience. Exceptions to the year's requirement may be considered based on the SLDs evaluation of the candidate's education, professional and project experience. Additionally, APRs must

be proven as competent PMs. All the specific criteria for APR approvals for each service line are included in [Appendix H](#).

There are two APR application types; Standard and Tailored. The Standard APR Application applies to the typical professional who has developed their skills to a point of being eligible for APR status by experience, professional registration, completion of the [PM Development](#) course, and their self-study of Terracon policies and Geoprofessional Business Association (GBA) professional practice material. The Tailored APR Application is intended ONLY for senior staff with more than 20 years' experience who have joined Terracon as a recent hire or through a recent acquisition. Under special circumstances, a senior staff member of 15 to 20 years' experience will be considered for the Tailored APR application. The Tailored APR application is only applicable after six months of employment with Terracon, and eligibility closes after two years of employment at Terracon. If the applicant does not submit the application within their first two years of employment, then the Standard APR Application is to be used.

The following steps outline the process for APR appointment and review. The process of filling out the APR application and the subsequent approval steps below follow an electronic workflow process.

The following steps outline the process for APR appointment and review. The process of filling out the APR application and the subsequent approval steps below follow an electronic workflow process.

## **B.1 APR Candidate**

Each APRRC member takes responsibility for the APR candidates within their technical, service line and typically within their geographic responsibility. APRRC members work with DPMs, OMs and DMs to identify candidates and to assess their potential as an APR. APR candidates are typically identified one to two years in advance of 'eligibility.' The APRRC member oversees the candidate's preparation and readiness for the application process. The APRRC member may assign a mentor to the candidate. If assigned, the mentor must be an APR within the same service line as the candidate. The APRRC member or mentor is expected to work with the candidate throughout the review process and for a period of time following the candidate's APR appointment to ensure that Terracon quality policies and procedures are being followed and expectations are being met.

The APR preparation process typically includes attendance in APR preparation classes led by ASLDs. Multiple APR candidates work together as a group to complete the requirements of the APR application and to collaborate and build relationships. Once a candidate successfully completes all modules, the application should be ready for submission.

The APR candidate must complete the appropriate application found in the [APR Application Utility](#), checking off all required boxes before signing/submitting. The application can be saved and re-accessed at any time during the approval process to update progress on requirements until the SLD approves or denies the application.

When the mentor agrees that the APR candidate is thoroughly prepared, the APRRC member will discuss with the candidate their project experiences and together discuss and select at least three projects and deliverables for review. The APRRC member works with and interviews the candidate

to verify readiness to complete the approval process. When the APRRC member determines the candidate is ready, the application is finalized and electronically signed by the candidate, the APRRC member and is automatically sent to the appropriate DM for their approval.

Once the application has been signed by both the APRRC member and DM, the workflow process will send the application to the **APR Program Administrator (APRPA)** to initiate the review process.

## B.2 APR Review Process

The APRPA will receive the signed application and contact the APRRC member to identify three reviewers to assign to review the three representative projects designated on the APR candidate's application. The review focuses on the proposals, project documentation, compliance with Terracon standards, financials, invoicing, deliverables, etc.

Following assignment of the projects, the review process is as follows:

- APRPA sets up the project review feedback call and interview.
- Once both meetings are scheduled, the APRPA marks the application as "interview scheduled," which forwards the application to the SLD for approval following the interview.
- Once complete, the peer review comments are compiled by the APRPA and distributed to the APR review team, consisting of the SLD, ASLD, DM, APRRC member and the peer reviewers, in preparation for the APR candidate project review feedback call and final interview.

If, during the APR candidate project review feedback call, the SLD determines that the APR candidate would benefit from additional, focused mentoring in one or more aspects of their APR responsibilities, the ASLD and APRRC will work with the SLD to develop a specific plan to address these responsibilities. The APR candidate will, under the direction of the ASLD and APRRC, execute this plan before the final interview is conducted. The APR candidate will proceed to final interview after the ASLD has determined that the candidate has addressed the needs that were identified in the project review feedback call.

## B.3 APR Candidate Interview

When possible, the final interview is scheduled within one week of the project review feedback call. The APR review team will participate in a virtual interview. The interview addresses the APRs knowledge and confidence regarding the following topics:

- Project safety (particularly the role of the APR);
- Knowledge of this PQM, [Quality Program Manual \(QPM\)](#), QMS and Risk Management Policies;
- Knowledge of Terracon standards and processes;
- Awareness of APR responsibilities and limitations;
- Project management strengths;
- Attitude toward standards and quality; and
- Other topics as determined by the peer review team based upon the prior review process and the interview discussion.

## B.4 APR Approval Decision

Following the interview, the interview team determines whether the APR candidate meets the requirements of an APR.

- If the APR is approved, the SLD and the CDO will approve the application.
- Once approved by the CDO, the APR candidate is notified by email of the approval and the practice areas for which they are approved.
- If the APR is not approved, the APR candidate is notified by the APRRC member and/or the ASLD. The reasons for non-approval will be reviewed, and a strategic improvement plan will be agreed upon with a deadline for completion by the candidate. At the end of said time period, the candidate will be re-evaluated, and a second interview may be required.

The APR Approval Process is illustrated/summarized as follows:





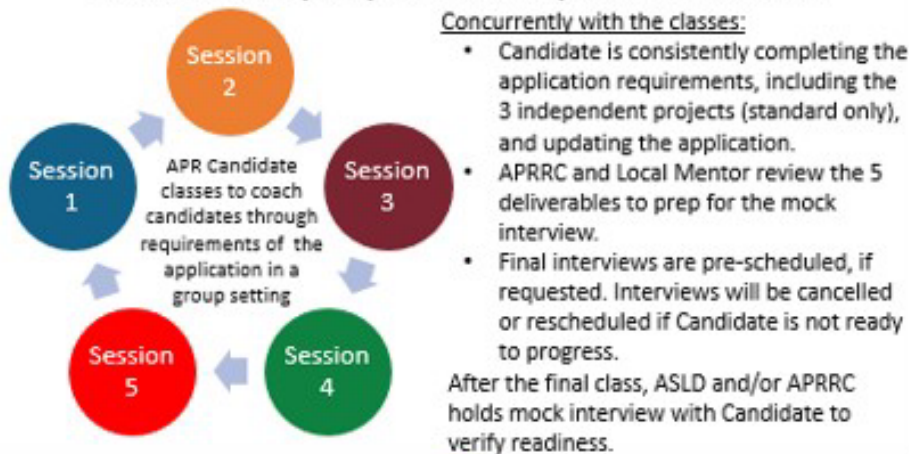
## APR Approval Process

Candidates can be identified 3 months to 2 Years prior to entering the process



APR Candidate identified – The APRRC, ASLD and Division Manager along with the local Office and Department Managers work together to identify APR candidates and to determine readiness.

The APR Candidate Class lasts from 12 to 18 weeks, depending on the service line and number of sessions (5 or 6). Attendance is expected to move forward.



Digital Signature

APR Candidate signs the application and initial approvals by the APRRC and Division Manager prompt the next step.

### Standard Applicants (3 to 4 Weeks)

- Project reviewers assigned for 3 independent projects.
- APRPA sets up Project Feedback Call and Interview.

1-hour Project Feedback Call  
(candidate does not attend)

2-hour APR Candidate Interview

OR

### Tailored Applicants (Generally, within 1 week)

- APRPA sets up Project Interview.

1.5-hour APR Candidate Interview

Service Line Director Approval

Chief Development Officer Approval

**APPROVED**



Once approved, APRs are expected to routinely visit the [Quality and Project Delivery \(QPD\) pages](#) on TerraNet. The main QPD page has a social feed, which gives both APRs and PMs a platform to share ideas, challenges, best practices, success stories and questions and answers about project delivery. We also use social to communicate important information, such as training opportunities, tools, updates to processes and systems, manuals and general correspondence regarding quality and project delivery.

### **C. ACQUISITION QUALITY INTEGRATION AND APR APPOINTMENT PROCESS**

With approval of the DM and the appropriate SLD, a company acquired by Terracon is allowed to continue to operate using its prior quality management system for an interim period if it contains similar project review practices using senior staff. The DM and SLD will develop an integration schedule for any acquisition company to become trained and compliant with Terracon's Corporate Quality Program. The acquired company will adopt and use the Terracon system at the earliest practical time, but in no case should this transition time exceed two years. The DM, with input from the senior leaders of the acquired company, will determine the integration schedule.

SLDs will coordinate with the DM to develop the timeline, training and APR selection. During this interim period, projects from the acquired company and new projects may be registered within PX using the designation of "Acquisition APR." After the integration schedule has been exceeded, the Acquisition APR selection will no longer be available for new project registration. After six months of employment with Terracon, satisfactory APR candidates from the acquired company may use the Tailored APR Application approval process as set out in [Appendix I](#). After two years, any new APR candidates from the acquired company will be required to use the Standard APR Application approval process also set out in [Appendix I](#).



## Appendix H

### APR Approval Criteria

The [APR Application Utility](#) is an electronic workflow designed to give APR candidates a checklist of requirements to meet prior to submittal as well as a way to administer the subsequent approvals in a timely manner.

There are two types of APR applications:

- 1) **Standard:** This application is the most common. It is intended for employees with 10+ years of overall experience and those who have been at Terracon for more than three years.
- 2) **Tailored:** This application is intended for employees with 20+ years of experience who have joined Terracon within the last two years either as a new hire or through an acquisition. If application is received after the two-year eligibility date, a standard application must be submitted.

*Note: On a case-by-case basis, a Service Line Director may make exceptions in the years of experience based on job performance as a Project Manager and technical expertise.*

Requirements to become an APR are listed in the table below, which mirrors the APR application:

| REQUIREMENTS                                                                                                                                                                                                                                                                                                                                | STANDARD  | TAILORED |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|
| PRACTICE AREAS                                                                                                                                                                                                                                                                                                                              |           |          |
| Candidate will check off at least one practice area for which they want to be approved as an APR.<br><i>Note: If the Candidate checks off more than one practice area, and the Review Team decides not to approve the Candidate for all of them, the application will be modified and approved for only the approved areas of practice.</i> | X         | X        |
| PROJECTS (FOR INDEPENDENT REVIEW)                                                                                                                                                                                                                                                                                                           |           |          |
| Candidate must upload 3 Projects to be independently reviewed by APRRC members or senior APRs (other than 5 deliverables mentioned below)                                                                                                                                                                                                   | X         | N/A      |
| FORMAL EDUCATION                                                                                                                                                                                                                                                                                                                            |           |          |
| <i>Note: Each service line has its own requirements regarding formal education and professional licensure or certifications. A candidate should discuss these requirements with his/her ASLD prior to submitting an APR application. Candidates must meet all requirements for the service line in this category.</i>                       | X         | X        |
| EXPERIENCE AND ABILITY                                                                                                                                                                                                                                                                                                                      |           |          |
| Minimum years of overall experience practicing in a professional position                                                                                                                                                                                                                                                                   | 10 Years* | 20 Years |
| Minimum years of experience as staff supervisor, department manager, or comparable position with increasing responsibility for the performance and review of work of other professional staff                                                                                                                                               | 5 Years   | 10 Years |
| In the case of an acquisition, approval by the acquired firm's senior management for tailored APR responsibilities.                                                                                                                                                                                                                         | N/A       | X        |
| Submitted to APRRC Mentor at least five deliverables (different projects than the three listed on the application) prepared by APR applicant                                                                                                                                                                                                | X         | X        |



|                                                                                                                                                                                                                                                                           |   |   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|
| Participate in an interview (preparatory) with the assigned APRRC member                                                                                                                                                                                                  | X | X |
| <b>CONTINUING EDUCATION</b>                                                                                                                                                                                                                                               |   |   |
| I have completed all five modules of Terracon's PM Development course or am actively working with my office manager to complete the modules.                                                                                                                              | X | X |
| I have read, understand, and agree to comply with Terracon's Project Quality Manual (PQM) and Quality Program Manual (QPM).                                                                                                                                               | X | X |
| I commit to use Terracon's systems for Project Delivery.                                                                                                                                                                                                                  | X | X |
| I have read, understand, and agree to comply with the Records Management Policy, including file organization and retention requirements.                                                                                                                                  | X | X |
| I have read, understand, and agree to comply with Terracon's Risk Management Policies.                                                                                                                                                                                    | X | X |
| I have read, understand, and agree to prioritize use of Terracon's contract forms (standard contract form and residential form).                                                                                                                                          | X | X |
| I understand the serious nature of the APR responsibilities, and I am committed to providing the necessary time and energy to maintaining the standards of the program.                                                                                                   | X | X |
| I understand the importance of timely APR services and will prioritize the time needed to serve as an APR.                                                                                                                                                                | X | X |
| I agree to complete annual continuing education requirements as training is developed and rolled out to stay in compliance with the Project Quality Manual (PQM).                                                                                                         | X | X |
| I agree to actively participate in surveys, programs, committees and forums to improve Terracon's Quality Program.                                                                                                                                                        | X | X |
| I am knowledgeable of the resources available from GBA and have access to relevant GBA publications and documents (electronic and hard copy publications can be ordered free from GBA at <a href="https://www.geoprofessional.org">https://www.geoprofessional.org</a> ). | X | X |
| I have completed the GBA Fundamentals of Professional Practice course (or similar loss prevention seminar) OR have been a presenter of at least five local internal risk management seminars using topics available from GBA Material.                                    | X | X |
| I have listened to the GBA Project Management Fundamentals, Volumes 1 and 2 Recordings (Recordings are accessible on the Quality/For APR Applicants/GBA Information and Materials page of TerraNet.)                                                                      | X | X |
| I have read the GBA publication entitled 'In House Review of Reports.'                                                                                                                                                                                                    | X | X |
| I have read ten relevant GBA case histories and discussed with my APRRC representative.                                                                                                                                                                                   | X | X |

| RESUMES                                                                                  |   |   |
|------------------------------------------------------------------------------------------|---|---|
| Candidate must upload a current resume to the system in order to submit the application. | X | X |

\* - Exceptions to the year's requirement may be considered based on SLDs evaluation of the candidate's education, professional and project experience.

For approval workflow process information, please see [Appendix G, Section B.4](#).

## Appendix I

### PM and APR Evaluations

Our quality management process includes the continuing evaluation of PMs and APRs. Continuing evaluation is integral to our process of constant quality improvement.

#### A. PM Evaluations

Project Managers are evaluated for quality as part of our employee annual review processes given that is one of their primary job responsibilities. In addition, PMs must meet the requirements of the [Managing Projects at Terracon - PM Training, Development, Selection and Approval Requirements](#), which is posted on the Quality and Project Delivery/PM page on TerraNet.

#### B. APR Evaluations

The final APR candidate review process consists of the review of three projects in which the candidate served as the PM. The APRRC will work with the APR candidate to select three representative projects that include the various APRs that typically serve as the APR for the candidate. This final project review process also allows the opportunity for the review team to evaluate the performance of each project APR. The review team's comments and observations will be documented on the APR Candidate Project File Peer Review form and provided to the APRRA. If the review team identifies quality concerns with the existing APRs work, this will be discussed with the APRRC, DM and SLD. The APRRC, DM and SLD will be responsible for determining corrective measures.

Additionally, APR Needs Assessments are performed on selected Divisions and Service Lines on an annual basis. The intent of the Assessment is to evaluate strengths and challenges that exist within the APR network with the end goal of this process to identify potential areas of improvement and whether the current APR resources appear appropriate to fit needs. The APR Needs Assessment evaluates the APR network within a Division and the performance of individual APRs is considered and evaluated based on their workload.

## Appendix J

### APR Continuing Education

As senior members of Terracon's professional service lines, APRs are expected to lead our efforts to continually improve our quality processes and to identify innovations and/or lead in the implementation of innovative processes. Each APR is expected to coach PMs and other staff as those individuals aspire to achieve APR status in the future.

Effective continuing education is an important part of the professional growth of the APR and the continuous improvement of Terracon's quality processes. This section outlines the specific requirements of our continuing education program.

Six hours of continuing education relating directly to the duties of an APR are required for all APRs each year. APR continuing education takes the form of in-person training, as well as virtual training activities. Subject matter shall include regular reminder education as to the quality and project delivery processes, and the specific duties of the PM, APR and Project EXEC to provide a solid foundation of knowledge of the Company's expectations relating to quality deliverables. It is also essential that APRs are made aware of any compliance issues regarding the review process and any current practice-related matters.

Notifications for APR continuing education opportunities is generally provided by email notification or on the [Quality and Project Delivery TerraNet page](#).

The components of continuing education regarding the APR process shall focus on:

- Review of Annual Project Quality Report information;
- Updates to Terracon's Quality Management Program;
- Quality process as outlined in this PQM;
- Competencies required for APRs;
- Best practices;
- Terracon standard templates, formats and processes for consistency of our deliverables;
- Lessons learned, both positive and negative, of APR involvement in specific projects;
- Terracon's Risk Management Policies; and
- Emerging trends affecting our practice.

### **OFFICE PROJECT QUALITY "BROWN BAG" SESSION**

The OM shall conduct an annual "brown bag" style meeting for their DPMs, PMs, DORs and APRs. Other topics will include best practices, Annual Project Quality Report information for the office, as well as standardized training materials provided to OMs by the QPDLT.

### **VIRTUAL CLASSROOM CONTINUING EDUCATION FOR APRS**

APRs are required to participate annually in service-line-specific virtual training sessions focusing on APR-specific issues. The content of these presentations will be prepared by the SLD with input from the QPDLT. PMs will be invited and encouraged to participate in all APR virtual continuing education opportunities.

These presentations may be conducted via virtual conferencing, conference calls or by other various internet technology systems.

## Appendix K APR Project Review Checklist

The following checklist is provided to assist APRs during project review. The APR must be involved from the proposal stage through completion of project. It is not mandatory to strictly follow each step, but all should be appropriately considered based upon project requirements.

### Proposal Review

- ☐ Is the scope of services appropriate to satisfy client objectives and well defined?
- ☐ Are the fees appropriate for the scope of services and contract terms?
- ☐ Is total Terracon fee larger than \$10,000 for Materials service lines? (If so, an APR must review the proposal.) For other service lines, APRs are to review all proposals.
- ☐ Is the project schedule achievable?
- ☐ Is the proposal using standard risk management language?
- ☐ Is an appropriate limitation of liability included in contract?
- ☐ Is a reasonable indemnification provision included in contract?
- ☐ Is the correct proposal template and format being used?
- ☐ Are Terracon Risk Management Policies being followed?
- ☐ Does the proposal have provisions for safety including equipment, labor, and planning, and have safety hazards and safety concerns been considered and discussed?
- ☐ Is the project designated a TYPE II project requiring a Project EXEC?
  - ☐ If yes, has Project EXEC been engaged in proposal process?

### Project Execution and Critical Junctures

- ☐ Are performed services adhering to proposal scope?
- ☐ Are safety practices and project safety requirements being adhered to?
- ☐ Have any unanticipated safety conditions arisen, and have they been properly addressed?
- ☐ Is the project designated a TYPE II Project requiring a Project EXEC?
  - ☐ If yes, has a Project Management Plan been established?
- ☐ Does the project entail non-routine calculations or require expertise of Subject Matter Experts (SMEs)?
  - ☐ If yes, consult with SMEs and PM to secure proper expertise
- ☐ Did PM encounter unanticipated conditions, deviations, or problems during data collection?
- ☐ Is a change in scope of services required?
- ☐ Is a change order necessary or an increase in fee?
- ☐ Is PM discussing findings and recommendations with APR?
- ☐ Is APR checking in with PM on project objectives, including scope, schedule and budget compliance?
- ☐ Are recommendations appropriate considering client and project risks?
- ☐ Are design data and calculations documented and checked, including any calculation spreadsheets?
- ☐ Are the parameters and assumptions used in the analyses supported by appropriate laboratory or field testing data?
- ☐ Is PM aware of correct templates to use in final report?
- ☐ Is PM providing final draft deliverables to APR well in advance of client due date?
- ☐ Is APR discussing and mentoring PM regarding comments and changes?
- ☐ Is PM proactively serving as a "consultant" and "advisor" to client?

### Review of Deliverables

- ☐ Is deliverable adhering to proposal scope?
- ☐ Does report and all exhibits professionally displayed and consistent with Terracon Standards?
- ☐ Are recommendations clearly presented and logical?

- ☐ Is deliverable addressing client and project risks?
- ☐ If multiple design alternatives/options are provided, are the risks associated with each discussed?
- ☐ Is data in deliverable correct, complete, and internally consistent with Appendix?
- ☐ Is deliverable reflecting any change orders?
- ☐ Is standard risk management language used?
- ☐ Have other Terracon service lines or offices provided deliverables on the same project site?  
(If yes, has PM confirmed, coordinated, and reviewed any findings with other service line's PM?)
- ☐ Is deliverable using correct grammar and language?
- ☐ Is deliverable issued to the proper parties and client?
- ☐ Have APR changes been made to final deliverable?



## Appendix L Data-Only Reviewer Approval

### DATA-ONLY REVIEWER APPROVAL

(Send to Office Manager – All Items Must Be Checked)

**PROPOSED QUALITY CONTROL REVIEWER NAME:** \_\_\_\_\_  
**SERVICE LINE:** \_\_\_\_\_

- ☐ Registration as an EIT or PE, or certification as a NICET Level II, ICC Special Inspector, AWS Certified Welding Inspector, or equivalent DOT certifications or other recognized national qualifications-based registration or certification.
- ☐ For Materials services, current Terracon job classification title is Technician III or higher (excluding Field Professional) or Staff Professional I or higher. For all other services, current Terracon job title is Project Professional I or higher.
- ☐ Clear understanding of the requirements and responsibilities of Data-Only Reviewer.
- ☐ Experience in the preparation of deliverables and written documents to be reviewed.
- ☐ Proven ability as author and reviewer of the type of reports to be reviewed. In addition, Office Manager or a designated Authorized Project Reviewer has reviewed at least five reports that have been completed by the proposed Data-Only Reviewer.
- ☐ Read and adhere to Terracon's Risk Management Policies.
- ☐ Read and adhere to Terracon's Quality Program and Project Quality Review Program Manuals.
- ☐ Read the GBA publication: *In-house Review of Reports*.
- ☐ Familiar with pertinent GBA publications and documents (these publications can be ordered free from GBA at [www.geoprofessional.org](http://www.geoprofessional.org)).
- ☐ Judged to have appropriate attitude toward the serious nature of the responsibilities assumed by a Data Reviewer.
- ☐ Demonstrates a willingness to honestly assess personal qualifications and seek advice and opinions from other senior staff and APRs as appropriate.
- ☐ Judged to have appropriate ability to proofread and edit text so it is clear and unambiguous from a client perspective.
- ☐ Signed by:

Proposed Data-Only Reviewer \_\_\_\_\_ Date \_\_\_\_\_ DPM \_\_\_\_\_ Date \_\_\_\_\_

Authorized Project Reviewer \_\_\_\_\_ Date \_\_\_\_\_ Office Manager \_\_\_\_\_ Date \_\_\_\_\_  
(If DPM or Office Manager is not an APR)

**THIS APPOINTMENT AND FORM SHALL BE POSTED TO THE OFFICE'S TERRANET SITE.**

## Appendix M Data-Only Reviewer Appointment Process

### **DATA-ONLY REVIEWER APPOINTMENT PROCESS**

DORs are appointed for the Materials and Facilities Service Line by the OM with input from the Materials or Facilities DPMs. The approved appointment lists and form for each office will be posted to the office's TerraNet site. See <https://terracon4.sharepoint.com/sites/Offices>.

The DOR Approval Form, attached as Appendix I, sets forth the guidelines for qualification as a Materials or Facilities DOR.

In this instance, the reference to Data-Only Review is only relevant to the deliverables in Facilities and Materials that do not contain opinions and does not relate to the more over-arching process of data review that occurs on any deliverable containing data.

## Appendix N

### Type II Project Delivery

***TYPE II projects are a major contributor to our vision for being dominant in our markets and are important to our financial success and we continue to grow them. How we support, collaborate, work and learn together impacts how we successfully deliver them.***

TYPE II Project Processes were developed to deliver a consistent project experience to identify and manage enterprise risk and to achieve professional development utilizing the experience and knowledge of our resources to promote project ownership, on-time delivery and client experience success. Type II Projects and Programs are challenging and complicated in a variety of ways.

Objectives of the TYPE II Project Process are to:

- Improve communication within Operations and Operations Development on TYPE II project opportunities,
- Define expectations of the project team, including project management execution and accountability,
- Understand and define project risks,
- Build on and utilize systems and tools we have in place to support project management,
- Adopt PM development practices,
- Focus on financial management planning during proposal and project pricing, and
- Enhance communication of project staffing selection, including PM/APR/SME/Project EXEC.

Keys to TYPE II Project success include:

- Communicating and collaborating effectively during the early stages of an opportunity, whether that is a pursuit, proposal or project,
- Selecting the right team members to lead the project, and
- Implementing project structure to manage project risks through setup and planning.

The TYPE II Project Process is expected to be initiated as early in the project stages as possible, including the pursuit stage. From a project tracking and management planning standpoint, the TYPE II Project Process is formalized when a proposal is entered into PX. The TYPE II Process is expected to be followed by PMs who have the responsibility to lead the process with support from the ASLD, Project EXEC and DM.

TYPE II Projects will vary in size, scope and risk, and thus, may require and need varied approaches and engagement by supporting project team members.

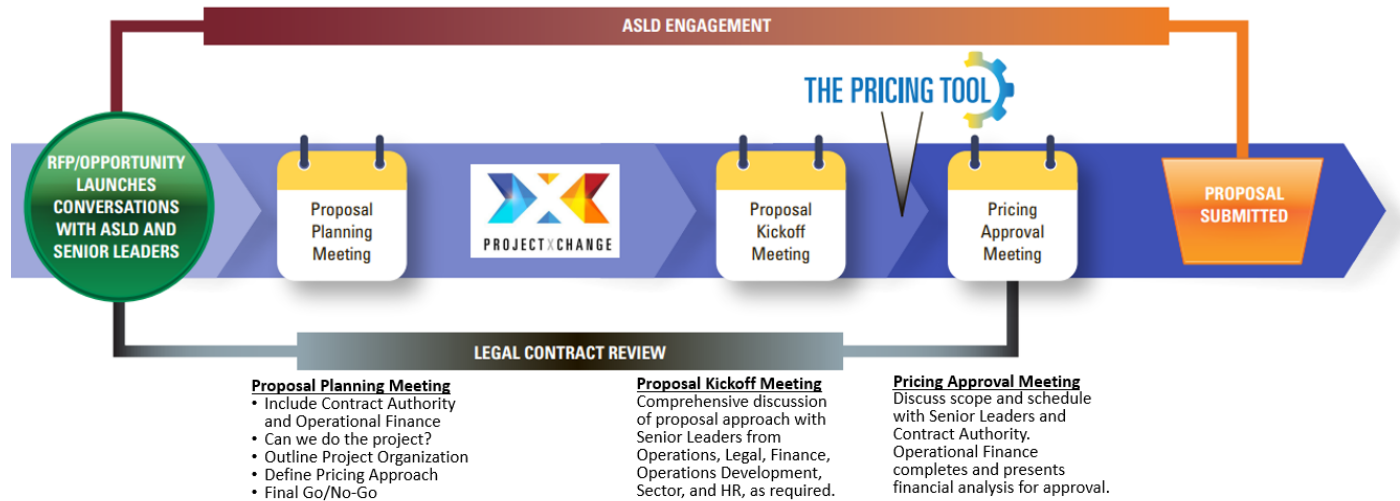
The intent of the TYPE II Project Process is to enforce the expectation of communication and partnership between operations, operational finance, operations development, service line and senior leadership resulting in on-time project delivery and client experience success.

## Appendix N.1 TYPE II Proposal Process

During the proposal stage for a TYPE II Project, or when a project proposal is identified as TYPE II, the PM will lead the project team through the following tasks:

- **Proposal Planning Meeting** – The purpose of the Proposal Planning Meeting is to have a high-level focused discussion regarding Terracon's ability to perform the project, the project organization, staffing and pricing approach, financial expectations, proposed project leadership, and initial understanding of project risks. The Proposal Planning Meeting should include final Go/No-Go discussions. Attendees should include, as necessary or required:
  - Contract Signing Authority (See [Risk Management Policy No. 8](#)),
  - Proposal Champion/Manager,
  - OM, DPM, APR, DM, ASLD, and SME,
  - Legal,
  - Representative of Operational Finance,
  - Sector Leader/Representative,
  - National Account Manager (NAM).
- **Project Exchange Entry** - Proposal entered/set-up in PX with complete and accurate project information included.
- **Legal Contract Review** – Contract has been sent to Legal Department ([contracts@terracon.com](mailto:contracts@terracon.com)) for review, if available.
- **Proposal Kickoff Meeting** – Comprehensive discussion of proposal approach, i.e., scope, pricing, finance, staff, schedule, contract, risks, safety, selection of the proposed PM and Team. Participants should include selected Senior Leadership from Operations, Operations Development, Operational Finance, Sector, Legal and HR, as necessary/required. The intent of this meeting is to obtain consensus and agreement of proposed approach and pricing structure amongst the Team and Operational Leadership.
- **Enter Costing in Pricing Tool Application** – Complete pricing and budget estimates by Task with estimated WU/WD forecasts.
- **Pricing Approval Meeting** – Discussion of scope, schedule, and Pricing Tool budget with Project Team/Senior Leadership. Operational Finance completes and presents financial analysis for approval. Attendees must include Contract Authority.
- **Proposal Submittal**

## TYPE II PROPOSAL PROCESS



Defining success, together, by communicating and engaging across the Type II proposal process and delivering client success.

## Appendix N.2 TYPE II Project Process

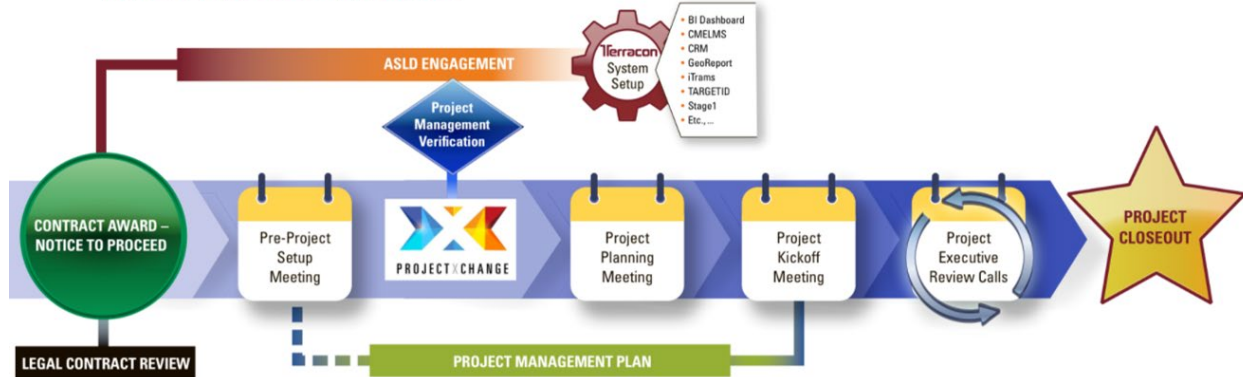
During the project set-up stage for a TYPE II project, the PM will lead the project team through the following tasks:

- **Pre-Project Setup Meeting** - Meeting/discussion to announce/update Project Team on proposal/contract acceptance with Operational Leadership, including Contract Authority approval to proceed.
- **Project Registration in PX** - Project entered/set-up in PX with complete and accurate information and validated by the PM.
- **Legal Contract Review** – Contract has been sent to Legal Department ([contracts@terracon.com](mailto:contracts@terracon.com)) for review and comment. The PM should have deliberate discussions with legal reviewer to discuss contract and project delivery risks. Risks should be discussed directly with the Contract Signing Authority.
- **Complete Project Setup in Terracon Apps/Systems** – CMELMS, GeoReport, iTRAMS, TARGETID, etc.
- **Develop Project Management Plan** – The PMP includes applicable project approach aspects for on-time project delivery, assigns responsibilities, project organization and levels of accountability, financial expectations and management approach, and establishes the agenda for the Project EXEC Review Calls.
- **Project Planning Meeting** – Comprehensive discussion of project approach and execution, (i.e., scope, pricing, financial approach and expectations, staffing, schedule, contract, risks, safety. The draft PMP should be presented at this meeting for discussion/comment. Attendees should include, as necessary or required:
  - Contract Signing Authority (See [Risk Management Policy No. 8](#)),
  - OM, DPM, APR, DM, ASLD, and SME,
  - Representative of Operational Finance,
  - Sector Leader/Representative,
  - Legal,
  - National Account Manager (NAM),
  - Representative from HR.
- **Project Kickoff Meeting** – Comprehensive project discussion focused around the presentation of the final Project Management Plan and project approach to the active project team members, including discussion of project risks and financial management approach and expectations. Project organization and roles should be clearly defined in this meeting. A separate Client-engaged Kickoff Meeting is also suggested.
- **Project EXEC Calls/Project Reviews** – The Project EXEC/Project Review calls are critical to the success of a TYPE II project. The frequency, participants and agenda items for these calls are included in the PMP. Primary agenda items should always include safety, quality and risks, financial performance, staffing, schedule and the client experience/management. The attendees should always include the DM and OGM.
- **Closeout Process** – In addition to the required project closeout summarized in Section 4.3, the TYPE II project closeout process should include a discussion, presentation and/or documentation of “lessons learned”, project successes, project challenges.





## TYPE II PROJECT PROCESS



Defining success, together, by communicating and engaging across the Type II proposal process and delivering client success.



## Appendix N.3

### Project EXEC Oversight Checklist

The following checklist has been prepared to assist the Project EXEC during project oversight. A Project EXEC is responsible for identifying the business need, problem, or opportunity and ensures the project benefits and results are realized, while supporting the PM with resolution of any issues that arise during a project. Project EXEC oversight does not replace the APR, nor does it relieve them of the responsibilities for checking and reviewing the project from proposal to closeout. Some of the objectives of Project EXEC oversight are as follows, but are not all inclusive:

- Engage in the pursuit process providing oversight to the PM and APR, including proposal preparation, to provide input and direction, as needed;
- Assure that the APR and PM have the qualifications, skills and experience appropriate for the project, and that they work together to fulfill the duties of the project in a timely manner;
- Confirm that, when necessary, appropriate SMEs have been engaged and are serving the roles on the project as designated by the APR;
- Ensure that the Contract has been reviewed by Legal as early in the process as possible, ideally at the proposal stage to review and discuss project delivery and contract risks with the PM, APR and Project EXEC.
- Provide an independent oversight of the project to ensure that all the criteria of project success are considered, including safety, budget, financial performance, risk, client expectations, schedule, and quality perspectives. Facilitate the development of recovery plans, as necessary.
- Ensure that the PM and APR understand the TYPE II Proposal and Project Processes and confirm that the processes are followed and completed as necessary.
- Work with the PM to develop the Project Management Plan to include items that are critical to project delivery success.
- Ensure that the PM periodic Project EXEC/Project Review calls on a periodic basis in accordance with the Project Management Plan to provide project status and progress to the DM and OGM. Participate and be engaged in the Review Calls. The Project EXEC, in some cases, may lead the Review Calls.
- Ensure that the project budget and financial performance is being managed appropriately. Provide support to the PM with change management as necessary.
- Assist the PM with client contacts and attend selected meetings, especially related to financial, risk, and/or contractual matters as necessary.
- Ensure the final close-out of the project to include external and internal lessons learned, client satisfaction, financial completion, and identification of additional client project opportunities.

Actual activities and level of effort required to achieve the objectives stated above should be determined by the Project EXEC based on the complexity of the project and the apparent care, skill and quality of the services provided by the PM and the APR. The Project EXEC should be involved from the early stages of the project, including proposal preparation, to provide input and direction as needed.

For all TYPE II projects, the development of a PMP is required. The PMP template should be used to develop an overall project approach to ensure the efficient execution and on-time delivery of the project. The Project EXEC along with the PM and APR should determine the appropriate level of detail needed for an effective PMP based on the complexity of the project.

Depending upon complexity of the project, some or all of the following items should be considered as part of the Project EXEC oversight:

### **Administrative Oversight**

- ☐ Has a PMP been established and followed for overall direction on the project?
- ☐ Have the Project EXEC and APR discussed and defined their responsibilities and schedules with one another?
- ☐ Are project reviews being held consistent with the PMP and are all required team members attending?
- ☐ Have lines and procedures for communication with the client been established and used to discuss needs and progress of the project?
- ☐ Has the PMP been discussed so all key project members are aware of and fully understand the project's budget, scope, schedule, client expectations, client interaction/relationships and established goals for project success?
- ☐ Is the project safety plan and approach included in the PMP and been discussed with all project members, including the plan and frequency of site safety check-ins?
- ☐ Does the PMP include periodically updating the DM and/or OGM on the status of the project, including quality, safety and financial management, staffing, schedule and on-time project delivery?

### **Technical Oversight**

- ☐ Have the APR and PM been assigned to the project and are their experience and expertise appropriate for the project?
- ☐ Have required and sufficient SMEs been retained and properly utilized to achieve the desired results?

### **Financial Oversight**

- ☐ Has a financial analyst been designated for the project?
- ☐ Has the project budget been entered into PX by Task?
- ☐ Does the project have an estimated WU/WD and is it entered into PX accordingly?
- ☐ Is the PM tracking project costs and labor hours to meet budget?
- ☐ Is the PM holding meetings with accounting staff and key staff to review budget status and ability to complete project within budget?
- ☐ Is the PM forecasting Estimate to Complete or Earned Value to monitor financial success of the project?
- ☐ Is the PM managing project change requests and change orders timely and prior to initiating new scope items?
- ☐ Is the PM communicating with the client periodically regarding budget management and soliciting change orders when task budgets are exceeded?

### **Risk Oversight**

- ☐ Are the PM and the APR cognizant of the project risks?
- ☐ Are steps being taken to monitor, manage and mitigate risks?
- ☐ Are the PM and APR evaluating new risks that may occur during the project life cycle, and preparing a plan to monitor, manage and mitigate risks?
- ☐ Are milestone specific risk reviews being performed?

### **Schedule Oversight**

- ☐ Are the PM, APR and project team meeting on a regular basis to review project status and to determine LOE to complete the project on schedule and on budget?
- ☐ Does the PM have the resources available to keep the project on schedule? If not, is the APR assisting in locating resources to meet schedule?

### **Client Relationship Oversight**

- ☐ Is there evidence of a positive client relationship with the PM/project team?
- ☐ Does the PM hold regular meetings with the client to keep them apprised of project status, scope, schedule, and/or budget issues?
- ☐ Has the PM kept the client informed on preliminary findings or other factors that would be beneficial for the client to have knowledge of during the project, prior to its completion?
- ☐ Is an effort being made to maintain a client relationship to verify that the project team is meeting client expectations?
- ☐ Has a client development plan been completed to identify other opportunities to do work for the client?

### **Project Close-out Oversight**

- ☐ Share critical concerns or comments regarding the performance of the APR with the Service Line Director.
- ☐ Has the project been closed to charging upon completion?
- ☐ Has all WIP been removed and A/R collected?
- ☐ Has an internal and external lessons learned document been developed and shared with the project team and other interested parties?

## **Appendix N.4**

### **Project Management Plan Template**

[Link to PQM Library of Updated Templates and Example Plans](#)



**[Project Name]**

**[Project Number]**

## **Project Management Plan**

The Terracon Project Management Plan (PMP) is an integral component to consistently deliver successful TYPE II Projects. The PMP defines the approach and expectations to assist our Project Managers, APRs, Project Executives and other integral project team members execute their responsibilities for managing and delivering safe, quality, technically excellent, financially strong projects on-time and in turn providing a successful client experience that sets us apart from our competitors.

The [Project Name] project is identified and confirmed as a TYPE II Project. Terracon's Project Quality Manual (PQM) outlines the requirements for a TYPE II project and requires a Project Management Plan. The PMP provides applicable project approach aspects for on-time project delivery, assigns responsibilities, project organization and levels of accountability, financial expectations and management approach, and establishes the agenda for the Project EXEC Review Calls.

### **1.0 PROJECT INFORMATION AND OVERVIEW**

The project includes [Describe the project scope of work.]

If project is Design-Build, additional sections may be needed to discuss the Design-Build Client Team, Project Background, Benefits, Goals, etc.

### **2.0 CONTRACT TERMS AND DETAILS**

**Client:**

**Date Executed:**

**Contract Value:**

**Contract End Date:**

**Terracon Contract Authority:**

**Contract Type:** - Standard Agreement or Short Form Agreement?

- Master Service Agreement
- Modified Terracon Agreement
- Client-Provided Agreement
- Other

**Client Contract Number/Purchase Order No.:**

The contract review and Risk Analysis was performed by [Legal Contact/Reviewer] and was completed on [Date]. The Risk Analysis Form is attached to this document for reference. The contract review identified the following contract terms of specific note and risk:

- Limitation of Liability
- Indemnification
- Standard of Care/Warranty
- Waiver of Consequential Damages
- Payment Terms

Additional contract delivery risks were identified as follows:

- Change Order Approval Process
- Invoice Delivery/Submittal

At this point, the contract has already been reviewed and executed. It is critical that the Project Manager and Project Team has read the contract and is fully-aware of the terms, requirements and risks. Additional contract details and discussion may include:

- Invoicing Schedule and requirements (what is best schedule to manage cash flow, and AR. Likely not Terracon internal invoicing schedule)
- Payment Terms - Retainage
- Client Deliverables and Expectations of Delivery
- Penalties
- Savings back to owner (either based on payment terms or contract language)
- Who is defined as responsible party in contract?
- Who can execute Change Orders for Terracon and Client
- Other key items identified by Team in review of contract

### **Subcontractor Agreement Details**

If Terracon is subcontracting any work as part of this project, include subcontract details and discussion, including scope of subcontractor, agreement, rates, schedule, etc. Attach subcontract agreement to the PMP.

## **3.0 TERRACON PROJECT TEAM AND RESPONSIBILITIES**

- Contract Authority:
- Senior Project Manager:
- Project Executive:
- APR:
- SME:
- Division Manager:
- Assistant Project Manager:
- Financial Analyst:
- ASLD:



- Project Coordinator:
- Design Quality Manager
- Field Manager

*Project Team will be the participants in the Project Review Calls.*

If there are additional responsibilities due to specific project requirements, include below. [If there is an organization chart for this project, please attach it to the PMP. Modify this list as best fits your project. Include subcontractors, if applicable, and list their projected significant contributions to this project.]

**Project Executive (Project Exec) – Name**

The Project Executive will provide overall project leadership and independent review of project delivery, including client relationships, financial oversight and risk management. The Project Executive is also responsible for approving and ensuring the implementation of the Project Management Plan and supporting the Project Review Meetings. The Project Exec is encouraged to use Appendix K of the PQM (Project Exec Oversight Checklist) to ensure that his/her responsibilities are being fully executed.

**Assistant Service Line Director (ASLD) – Name**

The ASLD will work under the general direction of the Service Line Director and the Operating Group Manager to promote the safety, quality, profitability, and growth of the service line. To this end, the ASLD will assist and support TYPE II project as needed. The ASLD may or may not have an expanded role in the project and be a part of the project team.

A TYPE II Project is confirmed by the ASLD in collaboration with the DM based upon their judgment of size, scope, risk or opportunity.

**Project Manager/Senior Project Manager – Name**

The Project Manager leads the project and is responsible for managing all aspects of the project, including but not limited to financial, safety, quality and the client experience.

**Assistant Project Manager – Name**

**Authorized Project Reviewer (APR)/Quality Assurance Manager – Name**

**Subject Matter Expert (Area of expertise for this project) – Name**

**Financial Analyst and/or Project Accountant – Name**

The project accountant may assist the project manager with billings and required paperwork, preparing administrative and financial reports preparing invoices for the PM's review. They may support the project by setting up the budget, verifying weekly bookings and support budget tracking.

**Project Coordinator(s) – Names**

The project coordinator will serve as the document control manager and will assist the project manager with preparing and submitting project deliverables.



**Division Manager**

**Office Manager**

**Department Manager**

**Subconsultants** - Define the subconsultants/subcontractors and their scope and role.

**Laboratory Services**

**Field Staff**

**Drilling Services**

Project Executive Committee Identify the members of the Committee, frequency and agenda of meeting and scope of the Project Executive Committee's role on this project.

#### **4.0 PROJECT STAFFING PLAN**

The project staffing plan will align with the project budget and manpower estimates. If applicable and necessary, include discussion on staffing needs and management plan.

Should include any specific experience or certification requirements and hiring plans/needs.

#### **5.0 FINANCIAL MANAGEMENT**

##### **Project Budget and Tracking**

List the financial targets for this project as agreed upon in the pricing phase. Use Budget by Task.

Include WU/WD Plan from Pricing vs Project Award Analysis – How does the WU/WD plan align with project WU/WD analysis – what changes may occur and how does that impact original plan?

**Change Management** – Discussion may include tracking changes in scope. Work should not be performed on any change order work without authorization. Change order work should be tracked using additional tasks to keep it separate for billing and tracking purposes. Monthly discussions regarding changes/change management should be conducted with owner and subcontractors on cost issues for timely resolution. Any specific changes to contract should be priced and tracked separately with pricing reviewed by Project Executive before submittal to owner.

**Subcontractors** - How do we manage the labor, equipment, expenses and subcontractors? A detailed task list should be developed by the project manager based on the detailed estimate to track costs. What are the contract terms (unit fee, cost plus, or lump sum), mark-up added to subcontractor invoices, payment terms and invoicing schedule?

**Other Direct Costs and Considerations** – Staff compensation/per diem, burdened costs, equipment.

**Billing Strategy and Invoicing Procedures** - List specific plans/requirements for invoicing, including any client-provided specifications.

### **Portfolio Project Parameters and Expectations**

**Financial Forecasting** – Work with Financial Analyst and Project Executive to manage burn rate and allow forecasting based on actual work performed and remaining. Should be completed on a monthly basis to evaluate performance vs WU/WD.

**Financial Reporting** – As part of the monthly Project Executive Committee, a financial summary shall be provided. It should include, projected WU/WD, forecast of all labor, expenses, equipment, and subcontractors. What are expectations for client financial reporting?

#### **Financial Goals**

Financial targets will be achievable and agreed upon by all senior staff. List the financial targets for this project. How do we achieve the targeted goals? What are project book rates to manage to?

## **6.0 INTERNAL COMMUNICATIONS**

Integral to successful delivery of a Type II project is the need to develop a communication plan for the internal team.

It is important that the PM and Project Executive engage in discussions about the project and develop a schedule for their coordination. In addition, a Project Executive Committee should be defined so the PM and Project Executive can present the project progress and receive input from other key internal stake holders. Project Executive Committee calls shall be based on the attached Agenda (modified accordingly to meet the project needs).

Subcontractors should be treated as an extension of Terracon. To be successful, subcontractors should be included in all project planning meetings, so they understand importance of this project to Terracon. Depending on the size and scope of the contract their involvement in the Project Executive Committee calls may be warranted. What is our communication and plan to actively manage the subcontractors (i.e. – weekly meetings, cost issue review meetings, subcontractor change orders, pricing into any owner changes).

Present a communication matrix and plan.

Meetings to be conducted (Agenda, simple, minutes, and commitments)

- Kick-off Meeting(s)
- Daily (Pretask Planning, Schedule, Staff Planning, Subcontractor coordination)
- Weekly (Tool Box Talks, Check-Ins, Schedule, Staff Planning, Subcontractor Coordination)
- PM and Field Staff – What challenges do we have?
- PM and Project Executive – Project status – labor issues, change management, etc.

- Monthly (Schedule, Staff Planning, Subcontractor Coordination – invoice review and change management, Project Executive Committee, Billing review and Discussion, Financial Forecasting Discussions)

## 7.0 EXTERNAL COMMUNICATIONS

This section pertains to project-specific communications, primarily based on the desires of the client. It may contain information regarding scope creep; notifications of budgets reaching 50%; financial reporting on the project and the frequency of such reporting, including to whom the reporting will be conveyed; and plans to realign activities should the project run into problems that affect the budget.

Define who is managing the client. What does success look like for our client? How do we manage the project to ensure their success? What are the client's goals and expectations for the project? Who is called and notified when there is an issue that needs resolution.

This will be project specific and will be fluid as the project progresses.

Define in this section who is to receive Terracon deliverables and schedule/frequency.

The following meetings may be appropriate or required the client (or any other external partners)

- Daily (safety, project requirements, quality, deviations, results and findings)
- Weekly (safety, project requirements, deviations – open and resolved)
- Attend owner, architect, contractor meetings
- Monthly (Schedule, Budget/Change Management, Invoice Review)

## 8.0 SCHEDULING

[Insert project scheduling information here, including milestones and estimated project completion date.]

Considerations - In this section define who is responsible for Terracon's schedule. Is the schedule owned and developed by Terracon or other entity? Software used?

How do we communicate schedule with owner and team members and subcontractors? Are we reacting to contractor schedule?

Schedule ties very closely to budget – burn rates on labor need to be considered

How often is schedule reviewed and compared to project budget?

Staffing to the project schedule.

## 9.0 SAFETY AND IIF

Terracon is an *Incident and Injury Free (IIF)* company, and that core value will be evident on this project. Terracon's core rules and practices will be followed, and all team members will be empowered to stop work for any potential safety hazard until the issue has been addressed to the satisfaction of the team member and PM.

- Violations of Terracon's or the project specific safety standards will result in removal from the project at the PM's discretion.
- The PM will visit the site [frequency – bi-weekly, monthly, etc.] with the intent of having safety conversations with the lead technician and other technicians working at the site.

Describe project-specific safety issues that are currently known and what the plan is to address the issue(s).

Is there a Project Safety Plan, either internally or client/contractor provided? If so, reference and include a Team review process.

What are the client and contractual safety (external) requirements? What are the general contractor requirements and training? For example, orientations, drug screening, pre-task planning reporting, tool box talks reporting, near miss reporting.

How do you report a recordable incident on the project site?

Define list of known project specific safety risks that will need to be addressed on the project and how those will be addressed. For example – confined space, exposure to contaminated soils, fall protection, excavation safety, ladder use age, etc.

Define site check-in schedule to discuss safety with on-site team members.

## 10.0 PROJECT RISKS AND MANAGEMENT

Key factors, conditions, or circumstances associated with the project, including project, contract and client risks, if not properly accounted for, could have a significant negative impact on the project.

### Project Risks – Internal to Terracon

- Contract Risks
- Project Delivery Risks

### Project Risks – External to Terracon

[For each risk, identify mitigation measures to be implemented to limit Terracon's risk and/or risk to the client. List any factors, conditions, or circumstances viewed as favorable or positive in performance of the project.]

Risks are fluid on a project and change from week to week, month to month. How do we manage them?

Planned/known risks accounted for from the proposal stage should be identified here so they can be managed properly.

## **11.0 QUALITY PROGRAMS AND COMPLIANCE**

Terracon's commitment to quality requires that all our employees and subconsultants be familiar with and trained in implementation of the Terracon and project specific QA/QC programs. Each member of our project team participates in assuring that all steps in project QA/QC are thoroughly completed and documented in a timely manner. Continued commitment to quality is essential to Terracon's success in serving both our clients and the public.

The QA/QC program is mandatory for all staff levels and includes checking calculations and following the Terracon Quality Program, as well as complying with the project plans and specifications. Not following the Terracon or the project specific QA/QC programs will be grounds for dismissal from the project.

Modify accordingly and describe specifically how quality will be implemented and verified on this project – identified critical junctures, calculation checks, drawing checks, APR reviews, etc.

Describe, reference and discuss project-specific quality plans or programs and how they will be managed.

Are separate accreditations or licenses required to support/deliver the project?

Define project-specific quality requirements from the plans and specs for sharing with team.

Subcontractor quality management discussion.



## Appendix N.5

### TYPE II Project Process Meeting Agenda

Included herein are suggested agenda items for the critical meetings included in the TYPE II Proposal and TYPE II Project Processes. The suggested agenda provided should be considered all-inclusive and should be discussed with the PM, APR and Project EXEC to develop appropriate meeting agenda to meet the specific project needs and requirements.

#### Proposal Planning Meeting

The meeting focus should be a high-level discussion that should include the following topics:

- Terracon's ability to deliver the project
- Staffing expectations/requirements and approach (availability, experience, certifications/licenses).
- HR concerns
- Project schedule
- Discuss project leadership and organization - Senior Project Managers, Project EXEC, APR, SME.
- Define and discuss potential pricing approaches and financial performance expectations. Assign Operational Finance Reviewer/Representative to work with Project Team
- Initial understanding of risks
- Contract availability for review
- Proposal submittal schedule and time to prepare proposal and cost estimate
- Final Go/No-Go discussion/decision

Attendees should include, as necessary and required:

- Contract Signing Authority (See [Risk Management Policy No. 8](#))
- Proposal Champion/Manager
- OM, DPM, APR, DM, ASLD, Project EXEC and SME
- Legal
- Representative of Operational Finance
- Sector Leader/Representative
- National Account Manager (NAM)

If the consensus is to pursue the opportunity and prepare a proposal, the meeting should close with a focus on assigning responsibilities and establishing action item schedules and commitments. Confirm responsible party for completing the proposal, cost estimate, PX entry, and scheduling additional meetings. If more than one office will be involved, define the "controlling" office or cost center.

#### Proposal Kickoff Meeting(s)

The meeting(s) is a comprehensive discussion of proposed approach to project delivery and the effort of preparation of the proposal/submittal to the client. These meetings could be held as one single meeting, or separately.

##### Proposed Work Approach

- Project Overview and Client Discussion
- Scope of work
- Pricing and finances
- Staffing and project leadership



- Schedule
- Contract Review/Risk Analysis
- Safety Considerations

#### Proposal/Submittal Presentation

- Proposal/Submittal response requirements
- Support needed
- Assign responsibilities and establish dates for review
- Presentation

Attendees should include, as necessary and required:

- Proposal Champion/Manager,
- DPM, APR, SME, Project EXEC,
- DM, ASLD and OGM
- Legal
- Representative of Operational Finance
- Sector Leader/Representative
- National Account Manager (NAM)
- Corporate Marketing
- HR

#### Pricing Approval Meeting

- Presentation of Budget/Cost Estimate/Pricing Model
- Booking Rates
- WU/WD Analysis
- Discussion of Rates, Expenses, Subcontracts
- Burdened Costs
- Laboratory Services/Mobile Laboratory
- Per Diem
- Financial Expectations and Risks

Attendees should include, as necessary and required:

- Contract Authority (Required)
- DPM, Project EXEC, OM, DM, ASLD and OGM
- Representative of Operational Finance
- Sector Leader/Representative
- National Account Manager (NAM)

#### Pre-Project Setup Meeting

The objective of the Pre-Project Setup Meeting is to announce and update the project team on the contract award and status. The discussion should focus on any changes to the proposal, costs and/or approach made during contract award negotiation, if any, including an update on the status of contract review and risk analysis. The meeting attendees should include at a minimum the APR, DPM, OM, Project EXEC, DM and Contract Authority.



### Project Planning Meeting

- Presentation of draft Project Management Plan with discussion of:
  - Planned project approach and execution
  - Scope of Work
  - Pricing, financial approach and expectations
  - Staffing plan and schedule
  - Discussion of Contract, Status and Risks
  - Safety Plan and Considerations

Attendees should include, as necessary or required:

- Contract Signing Authority and/or DM
- OM, DPM, APR, ASLD, and SME
- Key Project Personnel
- Representative of Operational Finance
- Sector Leader/Representative
- Legal
- National Account Manager (NAM)
- Representative from HR

Critical information and expectations were established in the Proposal Kickoff Meeting. This information should be updated/presented in the Project Planning Meeting.

### Project Kickoff Meeting

- Presentation and comprehensive discussion of finalized PMP
- Project Roles and Responsibilities
- Project Overview
  - Client
  - Critical Milestones
  - Scope
  - Organization Chart
  - Communication Plan
- Contract Status and Discussion
- Change Order Management
  - Approach, tracking and client notification/submittal process
- Staffing
  - Final staffing model
  - Hiring plan, training, certification
- Safety Approach and Plan
  - Site Safety Requirements/Training/Orientation
- Budget Management and Tracking
  - Financial Management Plan
  - WU/WD
  - Invoicing Procedures

### Project Executive/Project Review Meetings

- IIF Moment
- Project Safety

- A. Identified hazards or changed conditions
- B. Site Conditions
  - i. Site specific conditions
  - ii. Site safety check-ins (Frequency, observations, who is performing)
  - iii. Site specific requirements (changes/updates/status)
  - iv. Staff Safety – Shift work, travel, fatigue, weather
- Project Performance
- Staffing / Schedule
  - A. Staffing plan - update
  - B. Staffing Needs
- Financial Management
  - A. Contract
  - B. Change Orders
  - C. Burn rates
  - D. Estimate to Complete
  - E. Current WU/WD
  - F. Accounting adjustments
  - G. Overall financial performance
  - H. Invoicing, WIP and AR
- Technical Issues
- Quality Issues
- Project Communications
  - A. Reporting
  - B. Client
- Technology
- Project Communications
- Additional Topics/Open Discussion/Questions

## **Appendix D:**

# **Analytical Laboratory Documents**

## Stipulation of Approval for Commercial Laboratory

According to Georgia State Law (O.C.G.A. 12-2-9) Commercial Rules for Commercial Laboratory Accreditation, any person submitting data to EPD prepared by a commercial laboratory shall stipulate that the laboratory is approved (Chapter 391-3-26-.05). The following information is provided as requested.

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Laboratory</b> | <b>Eurofins Atlanta<br/>3080 Presidential Drive<br/>Atlanta, GA 30340<br/>(770) 457-8177</b>                                                                                                                                                                                                                                                                                                                                          |
| Accredited By     | State of Florida, Department of Health, Bureau of Laboratories;<br>NELAP Recognized Accrediting Authority                                                                                                                                                                                                                                                                                                                             |
| Accreditation ID  | E87582                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Scope             | Drinking Water – Microbiology, Primary Inorganic Contaminants,<br>Secondary Inorganic Contaminants<br><br>Non-Potable Water – Extractable Organics, General Chemistry,<br>Metals, Microbiology, Pesticides-Herbicides-PCBs, Volatile<br>Organics<br><br>Solid and Chemical Materials – Extractable Organics, General<br>Chemistry, Metals, Pesticides-Herbicides-PCBs, Volatile Organics<br><br>Air and Emissions – Volatile Organics |
| Effective         | July 1, 2025                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Expires           | June 30, 2026                                                                                                                                                                                                                                                                                                                                                                                                                         |

|                  |                                                                                  |
|------------------|----------------------------------------------------------------------------------|
| Accredited By    | American Industrial Hygiene Association (AIHA)                                   |
| Accreditation ID | LAP-100671                                                                       |
| Scope            | Industrial Hygiene-Metals; Environmental Lead-<br>Paint/Soil/Wipes/Airborne Dust |
| Effective        | November 24, 2025                                                                |
| Expires          | March 1, 2026                                                                    |



## AIHA Laboratory Accreditation Programs, LLC

*acknowledges that*

### **Eurofins Environment Testing Southeast LLC**

**3080 Presidential Drive, Atlanta, GA 30340**

**Laboratory ID: LAP-100671**

along with all premises from which key activities are performed, as listed above, has fulfilled the requirements of the AIHA Laboratory Accreditation Programs, LLC (AIHA LAP) accreditation to the ISO/IEC 17025:2017 international standard, General Requirements for the Competence of Testing and Calibration Laboratories in the following:

#### **LABORATORY ACCREDITATION PROGRAMS**

|                                     |                                   |                                       |
|-------------------------------------|-----------------------------------|---------------------------------------|
| <input checked="" type="checkbox"/> | <b>INDUSTRIAL HYGIENE</b>         | Accreditation Expires: March 01, 2026 |
| <input checked="" type="checkbox"/> | <b>ENVIRONMENTAL LEAD</b>         | Accreditation Expires: March 01, 2026 |
| <input type="checkbox"/>            | <b>ENVIRONMENTAL MICROBIOLOGY</b> | Accreditation Expires:                |
| <input type="checkbox"/>            | <b>FOOD</b>                       | Accreditation Expires:                |
| <input type="checkbox"/>            | <b>UNIQUE SCOPES</b>              | Accreditation Expires:                |
| <input type="checkbox"/>            | <b>BE FIELD/MOBILE</b>            | Accreditation Expires:                |

Specific Field(s) of Testing/Method(s) within each Accreditation Program for which the above named laboratory maintains accreditation is outlined on the attached Scope of Accreditation. Continued accreditation is contingent upon successful on-going compliance with ISO/IEC 17025:2017 and AIHA LAP requirements. This certificate is not valid without the attached Scope of Accreditation. Please review the AIHA LAP website ([www.aihaaccreditedlabs.org](http://www.aihaaccreditedlabs.org)) for the most current Scope.

A handwritten signature in black ink that reads 'Cheryl O. Morton'.

Cheryl O Morton  
Executive Director, AIHA Laboratory Accreditation Programs, LLC



## AIHA Laboratory Accreditation Programs, LLC

### SCOPE OF ACCREDITATION

#### Eurofins Environment Testing Southeast LLC

Laboratory ID: LAP-100671

3080 Presidential Drive, Atlanta, GA 30340

Issue Date: 01/23/2024

Expire Date: 03/01/2026

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

The EPA recognizes the AIHA LAP, LLC ELLAP program as meeting the requirements of the National Lead Laboratory Accreditation Program (NLLAP) established under Title X of the Residential Lead-Based Paint Hazard Reduction Act of 1992 and includes paint, soil and dust wipe analysis. Air and composited wipes analyses are not included as part of the NLLAP.

#### Environmental Lead Laboratory Accreditation Program (ELLAP)

Initial Accreditation Date: 03/01/2000

| Component, parameter, characteristic, material, or product tested | Technology sub-type/Detector | Method           | Method Description<br>(for internal methods only) |
|-------------------------------------------------------------------|------------------------------|------------------|---------------------------------------------------|
| Airborne Dust                                                     | ICP                          | NIOSH 7300       | N/A                                               |
|                                                                   |                              | NIOSH 7303       | N/A                                               |
| Paint                                                             | AA                           | EPA SW-846 3050B | N/A                                               |
|                                                                   |                              | NIOSH 7082       | N/A                                               |
| Settled Dust by Wipe                                              | AA                           | NIOSH 7082       | N/A                                               |
| Soil                                                              | AA                           | EPA SW-846 3050B | N/A                                               |
|                                                                   |                              | EPA SW-846 7000B | N/A                                               |

A complete listing of currently accredited ELLAP laboratories is available on the AIHA LAP, LLC website at:  
<http://www.aihaaccreditedlabs.org>



## AIHA Laboratory Accreditation Programs, LLC

### SCOPE OF ACCREDITATION

#### Eurofins Environment Testing Southeast LLC

3080 Presidential Drive, Atlanta, GA 30340

Laboratory ID: LAP-100671

Issue Date: 01/24/2025

Expire Date: 03/01/2026

The laboratory is approved for those specific field(s) of testing/methods listed in the table below. Clients are urged to verify the laboratory's current accreditation status for the particular field(s) of testing/Methods, since these can change due to proficiency status, suspension and/or withdrawal of accreditation.

#### Industrial Hygiene Laboratory Accreditation Program (IHLAP)

Initial Accreditation Date: 03/01/2000

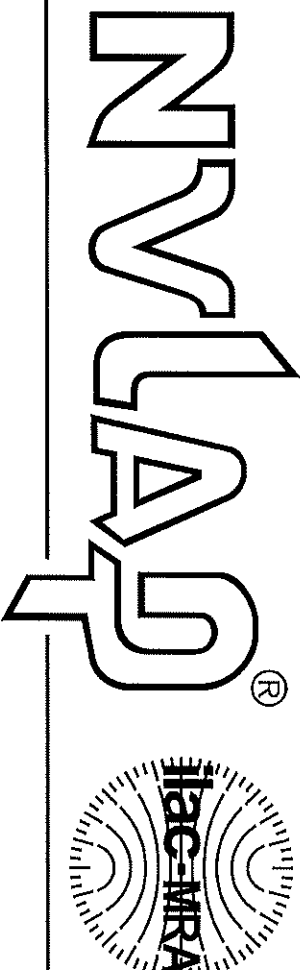
| IHLAP Scope Category | Field of Testing (FOT)     | Technology sub-type/Detector | Published Reference Method/Title of In-house Method | Component, parameter, characteristic, material, or product tested                            |
|----------------------|----------------------------|------------------------------|-----------------------------------------------------|----------------------------------------------------------------------------------------------|
| Spectrometry Core    | Inductively-Coupled Plasma | ICP/AES                      | NIOSH 7300                                          | Pb, Al, Sb, As, Ba, Be, Cd, Ca, Co, Cu, Fe, Mg, Mn, Mo, Ni, Se, Ag, Na, Tl, Sn, Ti, V, Zn, K |
| Spectrometry Core    | Inductively-Coupled Plasma | ICP/AES                      | NIOSH 7303                                          | Pb, Al, Sb, As, Ba, Be, Cd, Ca, Co, Cu, Fe, Mg, Mn, Mo, Ni, Se, Ag, Na, Tl, Sn, Ti, V, Zn, K |

A complete listing of currently accredited IHLAP laboratories is available on the AIHA LAP, LLC website at:

<http://www.aihaaccreditedlabs.org>



United States Department of Commerce  
National Institute of Standards and Technology



---

**Certificate of Accreditation to ISO/IEC 17025:2017**

---

NVLAP LAB CODE: 102082-0

**Eurofins Built Environment Testing Atlanta**

Atlanta, GA

*is accredited by the National Voluntary Accreditation Program for specific services,  
listed on the Scope of Accreditation, for:*

**Asbestos Fiber Analysis**

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.  
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality  
management system (refer to joint ISO-ILAC-IAF Communiqué on ISO/IEC 17025).*

2025-10-01 through 2026-09-30

Effective Dates



A handwritten signature in black ink, appearing to read "Robert J. Smith".

For the National Voluntary Laboratory Accreditation Program

**SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017**

**Eurofins Built Environment Testing Atlanta**

3080 Presidential Drive

Atlanta, GA 30340

Veronika Vratheva

Phone: 919-481-1413

Email: [veronika.vratheva@et.eurofinsus.com](mailto:veronika.vratheva@et.eurofinsus.com)

<https://www.eurofinsus.com/environment-testing/built-environment/>

**ASBESTOS FIBER ANALYSIS**

**NVLAP LAB CODE 102082-0**

**Bulk Asbestos Analysis**

**Code**

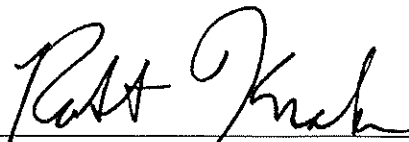
**Description**

18/A01

EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples

18/A03

EPA 600/R-93/116; Method for the Determination of Asbestos in Bulk Building Materials



*For the National Voluntary Laboratory Accreditation Program*

*Standard Operating Procedure for the*  
**Quality Assurance Manual**

**Eurofins Atlanta**  
Presidential Drive  
Atlanta, Georgia 30340-0370  
(770) 457-8177  
FAX (770) 457-8188



Garrett Ervin, Business Unit Manager

3/27/2024

Date



Ryan Sullivan, Laboratory Director

3/27/24

Date



Dana Till, Technical Director / Acting QA Manager

3/27/24

Date



Miriam Pacurar, Deputy Quality Assurance Manager

3/27/2024

Date

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## STANDARD OPERATING PROCEDURES FOR THE QUALITY ASSURANCE PROGRAM

### 2.0 TABLE OF CONTENTS

|                                                                | Page |
|----------------------------------------------------------------|------|
| 1.0 TITLE PAGE -----                                           | 1    |
| 2.0 TABLE OF CONTENTS -----                                    | 2    |
| 3.0 STATEMENT OF POLICY -----                                  | 7    |
| 3.1 Quality Policy -----                                       | 7    |
| 3.2 Purpose -----                                              | 7    |
| 3.3 Definitions -----                                          | 8    |
| 3.3.1 Quality Assurance -----                                  | 8    |
| 3.3.2 Quality Control -----                                    | 8    |
| 3.4 Fields of Testing -----                                    | 8    |
| 3.5 Management of the Quality Assurance Program -----          | 8    |
| 3.5.1 Manual Review -----                                      | 8    |
| 3.5.2 Policies or Procedures Needing Immediate Attention ----- | 8    |
| 3.6 Control of the Quality Assurance Manual -----              | 8    |
| 3.7 Order of Precedence -----                                  | 9    |
| 4.0 ORGANIZATION AND RESPONSIBILITY -----                      | 9    |
| 4.1 Organization -----                                         | 9    |
| 4.2 Organizational Structure -----                             | 9    |
| 4.2.1 Personnel Participation -----                            | 9    |
| 4.2.2 Organizational Understanding -----                       | 9    |
| 4.3 Organizational Chart -----                                 | 9    |
| 4.4 Responsibilities and Position Requirements -----           | 12   |
| 4.4.1 Business Unit Manager -----                              | 12   |
| 4.4.2 Laboratory Manager -----                                 | 12   |
| 4.4.3 Quality Assurance Manager Positions -----                | 13   |
| 4.4.3.1 Acting Quality Assurance Manager -----                 | 13   |
| 4.4.3.2 Deputy Quality Assurance Manager -----                 | 14   |
| 4.4.4 Department Director -----                                | 14   |
| 4.4.5 Technical Director -----                                 | 15   |
| 4.4.6 Microbiology Lab Supervisor -----                        | 16   |
| 4.4.7 Microbiology Analyst -----                               | 17   |
| 4.4.8 Technical Assistant -----                                | 17   |
| 4.4.9 Director of Project Management -----                     | 17   |
| 4.4.10 Project Manager -----                                   | 18   |
| 4.4.11 Department Manager -----                                | 18   |
| 4.4.12 Supervisors -----                                       | 20   |
| 4.4.13 Analysts -----                                          | 20   |
| 4.4.14 Project Manager Assistant -----                         | 21   |

## TABLE OF CONTENTS (cont.)

|                                                                           | Page |
|---------------------------------------------------------------------------|------|
| 4.5 Improper Actions, Data Integrity System, Client Confidentiality ----- | 21   |
| 4.6 Undue Internal and External Pressures -----                           | 24   |
| 4.7 Responsibility for QA Program Adherence -----                         | 25   |
| 5.0 QUALITY ASSURANCE PROGRAM -----                                       | 25   |
| 5.1 Purpose of QA Program -----                                           | 25   |
| 5.2 Revisions to QA Program -----                                         | 25   |
| 5.3 Definitions -----                                                     | 26   |
| 5.3.26 Estimation of Uncertainty -----                                    | 30   |
| 5.4 Data Quality Objectives -----                                         | 31   |
| 5.5 Criteria for Quality Indicators -----                                 | 31   |
| 5.6 External Quality Assurance Objectives -----                           | 33   |
| 5.7 Internal Quality Control -----                                        | 35   |
| 5.8 Procedures for Assessing Out-Of-Control Situations -----              | 49   |
| 5.8.5 Risks and Opportunities -----                                       | 49   |
| 5.8.6 Improvement -----                                                   | 50   |
| 5.9 Inter-laboratory QA and QC -----                                      | 52   |
| 5.10 Sample Dilution -----                                                | 52   |
| 6.0 SAMPLE BOTTLE PREPARATION -----                                       | 62   |
| 6.1 Sampling Services -----                                               | 62   |
| 6.2 Sample Container Preparation -----                                    | 62   |
| 6.3 Indicating Preservation on Containers -----                           | 62   |
| 6.4 Indicating Preservative Lot # on Containers -----                     | 62   |
| 6.5 Packing of Bottles -----                                              | 62   |
| 6.6 Sterile Bottles -----                                                 | 62   |
| 6.7 Preservatives and Removal of Interferences -----                      | 63   |
| 6.8 Bottle Kit Preparation -----                                          | 63   |
| 7.0 CUSTODY OF SAMPLES, EQUIPMENT AND SUPPLIES -----                      | 63   |
| 7.1 Review of New Work -----                                              | 63   |
| 7.2 Sample Receipt -----                                                  | 65   |
| 7.3 Review of Sample Login -----                                          | 68   |
| 7.4 Sample Receipt Non-Conformance -----                                  | 69   |
| 7.5 Health and Safety -----                                               | 69   |
| 7.6 Sample Custody -----                                                  | 70   |
| 7.7 Continuous Chains of Custody -----                                    | 71   |
| 7.8 Data Security -----                                                   | 73   |
| 7.9 Container Receipt -----                                               | 74   |
| 7.10 Subcontracting to Other Laboratories -----                           | 75   |
| 7.11 Purchasing Services and Supplies -----                               | 75   |
| 8.0 ANALYTICAL PROCEDURES -----                                           | 76   |
| 8.1 Method Sources -----                                                  | 76   |
| 8.2 Document Control -----                                                | 76   |
| 8.3 Instructions and Procedures -----                                     | 77   |

## TABLE OF CONTENTS (cont.)

|                                                                                                             | Page |
|-------------------------------------------------------------------------------------------------------------|------|
| 8.4 Electronic Document Control-----                                                                        | 78   |
| 8.5 Creating and Maintaining Standard Operating Procedures-----                                             | 78   |
| 8.6 Responsibilities -----                                                                                  | 79   |
| 8.7 Definitions -----                                                                                       | 79   |
| 8.8 New Procedure Initiation -----                                                                          | 80   |
| 8.9 Standard Operating Procedure Formatting-----                                                            | 80   |
| 8.10 Table of Contents-----                                                                                 | 81   |
| 8.11 SOP Body – Non-Technical (Administrative) -----                                                        | 84   |
| 8.12 Procedure Review and Revision-----                                                                     | 84   |
| 8.13 Technical Review-----                                                                                  | 84   |
| 8.14 Procedure Changes -----                                                                                | 85   |
| 8.15 Standard Operating Procedures Document Control -----                                                   | 85   |
| 8.16 SOP Uncontrolled Documents-----                                                                        | 85   |
| 8.17 Procedure Archive-----                                                                                 | 86   |
| 8.18 Temporary Change -----                                                                                 | 86   |
| 9.0 CALIBRATION PROCEDURES AND FREQUENCY-----                                                               | 89   |
| 9.1 Identification and Control of Materials, Parts and Components-----                                      | 89   |
| 9.1.1.1 AIHA LAP Traceability of Measurement Policy-----                                                    | 89   |
| 9.2 Instrumentation List-----                                                                               | 93   |
| 9.3 Measurement Traceability and Calibration-----                                                           | 93   |
| 10.0 PREVENTATIVE MAINTENANCE -----                                                                         | 95   |
| 10.1 Instrument Maintenance -----                                                                           | 95   |
| 10.2 Preventive Maintenance -----                                                                           | 96   |
| 10.3 Glassware Cleaning -----                                                                               | 96   |
| 10.4 Contamination Control -----                                                                            | 97   |
| 11.0 QUALITY CONTROL CHECKS AND ROUTINES TO ASSESS<br>PRECISION, ACCURACY AND METHOD DETECTION LIMITS ----- | 98   |
| 11.1 Control of Special Processes-----                                                                      | 98   |
| 11.2 Quality Control in the Laboratory-----                                                                 | 98   |
| 11.3 Inter-laboratory Quality Control -----                                                                 | 102  |
| 11.4 Out-Of-Control Conditions in Laboratory Control Samples -----                                          | 102  |
| 11.5 Identification of Analytes -----                                                                       | 102  |
| 11.6 Quantitation and Reporting of Analytes-----                                                            | 103  |
| 11.7 Reporting Data-----                                                                                    | 103  |
| 11.8 Storage of Quality Related Data-----                                                                   | 104  |
| 11.9 Internal Performance Audits -----                                                                      | 104  |
| 11.10 Failure of Quality Control Indicators -----                                                           | 105  |
| 12.0 DATA REDUCTION, REVIEW AND REPORTING -----                                                             | 105  |
| 12.1 Introduction-----                                                                                      | 105  |
| 12.2 Sample Analysis and Data Reduction -----                                                               | 105  |
| 12.3 Data Transfer and Review-----                                                                          | 105  |
| 12.4 Special Project or Data Package Review-----                                                            | 107  |
| 12.5 Quality Control Reports -----                                                                          | 107  |
| 12.6 Reporting Criteria -----                                                                               | 107  |

## TABLE OF CONTENTS (cont.)

|                                                                         | Page |
|-------------------------------------------------------------------------|------|
| 12.7 Record Keeping-----                                                | 108  |
| 12.8 Records of Analysis-----                                           | 108  |
| 12.9 Standard and Reagent Traceability-----                             | 109  |
| 12.10 Standard Verification -----                                       | 110  |
| 12.11 AIHA LAP Estimation of Uncertainty -----                          | 110  |
| 12.12 Recommended Storage Conditions -----                              | 121  |
| 12.13 Handling Standards and Reagents-----                              | 121  |
| 12.14 Record Keeping Definitions -----                                  | 122  |
| 12.15 Procedures for Record Keeping -----                               | 122  |
| 12.16 Record Storage-----                                               | 123  |
| 12.17 Quality Assurance Records -----                                   | 123  |
| 13.0 CORRECTIVE ACTION AND NONCONFORMANCES -----                        | 123  |
| 13.1 Defining, Implementing & Closing Corrective Action Report -----    | 123  |
| 13.2 Procedures and Responsibilities for Corrective Action Reports----- | 132  |
| 13.3 Method Suspension or Restriction -----                             | 132  |
| 13.4 Procedure for a Project Management or Customer Service CAR -----   | 133  |
| 13.5 Exceptionally Permitted Departures from Documented Policies-----   | 134  |
| 13.6 Addressing Complaints -----                                        | 134  |
| 13.7 Immediate and Long Term Corrective Actions -----                   | 134  |
| 13.8 Responsibility for Document Control -----                          | 135  |
| 14.0 PERFORMANCE AND SYSTEM AUDITS-----                                 | 135  |
| 14.1 Purpose-----                                                       | 135  |
| 14.2 External Audits -----                                              | 135  |
| 14.3 System Audits-----                                                 | 136  |
| 14.4 Blind Sample Audits -----                                          | 137  |
| 14.5 Quality Systems and LIMS Management Review-----                    | 137  |
| 14.6 Corrective Action-----                                             | 138  |
| 15.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT -----                      | 139  |
| 15.1 Internal Reports-----                                              | 139  |
| 15.2 External Reports -----                                             | 139  |
| 15.3 Quarterly and Annual Reports -----                                 | 139  |
| 16.0 REAGENT STORAGE AND DOCUMENTATION-----                             | 139  |
| 16.1 Safety and Shelf Life-----                                         | 139  |
| 17.0 WASTE DISPOSAL -----                                               | 141  |
| 17.1 Small Quantity Generator -----                                     | 141  |
| 17.2 Procedures -----                                                   | 141  |
| 17.3 Hazardous Waste Requirements-----                                  | 141  |
| 17.4 Sample Disposal -----                                              | 141  |
| 17.5 Organic Waste Disposal -----                                       | 142  |
| 17.6 Inorganic Waste Disposal -----                                     | 142  |



## TABLE OF CONTENTS (cont.)

|                                                                          | Page |
|--------------------------------------------------------------------------|------|
| <b>APPENDICES</b>                                                        |      |
| APPENDIX I (Waste Disposal Procedures) -----                             | 146  |
| APPENDIX II (Lab Equipment Preventive Maintenance Schedule) -----        | 147  |
| APPENDIX III (Lab Equipment List) -----                                  | 150  |
| APPENDIX IV (Chain of Custody) -----                                     | 159  |
| APPENDIX V - Form 1 (QAM Training Summary Sign-off Technical) -----      | 160  |
| APPENDIX V - Form 2 (QAM Training Summary Sign-off Non-Technical) -----  | 161  |
| APPENDIX VI (Corrective Action Form) -----                               | 162  |
| APPENDIX VII (Sample Receipt Checklist) -----                            | 163  |
| APPENDIX VIII (List of all methods under which lab is Accredited) -----  | 164  |
| APPENDIX IX - Form 1 (New Employee Initial QA Manual Training) -----     | 168  |
| APPENDIX IX - Form 2 (Employee SOP / QA Manual Retraining Form) -----    | 169  |
| APPENDIX X - General QA Manual SOP Training Form) -----                  | 170  |
| APPENDIX XI (Outside Reference Documents) -----                          | 171  |
| APPENDIX XII (EMLAP Specific Requirements) -----                         | 171  |
| <b>FIGURE</b>                                                            |      |
| Figure 4-1 Organizational Chart -----                                    | 11   |
| <b>TABLES</b>                                                            |      |
| Table 5-1 Demonstration of Capability Acceptance Criteria -----          | 38   |
| Table 5-2 Laboratory Water Quality Criteria -----                        | 48   |
| Table 5-3 Risk Assessment Table and Chart -----                          | 51   |
| Table 5-4 Summary of Calibration & QC Procedures for Various Tests ----- | 53   |
| Table 8-1 Technical SOP -----                                            | 82   |
| Table 9-1 AIHA LAP Calibration and Verification Frequencies -----        | 91   |
| Table 9-3 Reference Measurement Standard List -----                      | 95   |
| Table 10-1 Laboratory Glassware Cleaning Procedures -----                | 96   |
| Table 12-1 Contributors to Measurement Uncertainty -----                 | 115  |
| Table 12-2 Expanded Measurement Uncertainty Calculation Template -----   | 118  |
| Table 12-3 Estimation of Uncertainty Requirements for non AIHA LAP ----- | 119  |
| Table 16-1 Storage of Reagents and Chemicals -----                       | 140  |
| Table 16-2 Storage Requirement Key -----                                 | 140  |
| <b>ATTACHMENTS</b>                                                       |      |
| Attachment 1 Example SOP Acknowledgement Form -----                      | 87   |
| Attachment 2 Interim (Temporary or Permanent) Change Notice -----        | 88   |
| Attachment 3 Quality Assurance Manual Acceptance Agreement -----         | 167  |
| Attachment 4 Annual Management Review Template -----                     | 176  |

## 3.0 STATEMENT OF POLICY

- 3.1 Quality Policy: The objective of Eurofins Environment Testing Southeast, LLC., Atlanta (EETSE Atlanta) is to generate high quality data in a cost effective manner, which is accurate, impartial, reliable, and adequate for its intended use. Management of EETSE Atlanta is committed to following accepted laboratory practices to achieve high quality of testing services, and strives to ensure both the analytical validity and legal defensibility of all reported data **managed so to safeguard impartiality**.

EETSE Atlanta management is committed to compliance with The NELAC Institute (TNI) Standards, AIHA LAP International Standard, **Georgia EPD** as well as North Carolina and South Carolina rules to establish, implement, and maintain a quality system appropriate to the scope of all laboratory activities, including the type, range, and volume of testing. **ISO/IEC 17025:2017 is the basis of laboratory accreditations**. Management is committed to the accepted professional laboratory practices and shall document the policies, systems, programs, procedures, and instructions to the extent necessary to enable EETSE Atlanta to assure the quality of the test results generated. Management is committed to good professional laboratory practice to meet customer requirements with quality service.

**Laboratory management has established, documented, and maintained policies for the fulfilment of the purposes of this document and shall ensure that the policies and objectives are acknowledged and implemented at all levels of the laboratory organization. These policies address the competence, impartiality, and consistency of the laboratory operations. All documentation, processes, systems, records, related to the fulfilment of the requirements of this document shall be included in, referenced from, or linked to the management system.**

Quality system documentation is communicated to, understood by, and made available to personnel through EETSE Atlanta management by means of training and educational instruction. All laboratory staff concerned with analytical testing activities must familiarize themselves with the quality documentation and implement the policies and principles in their work. **Management communicates to personnel their duties, responsibilities, and authorities**. It is the policy of EETSE Atlanta to continually improve quality systems and provide support to improvement efforts.

- 3.2 Purpose: The Quality Assurance Program (QAP) sets forth the management policy, organizational structure, and procedures for chemical analyses performed by EETSE Atlanta. Management encourages the development and use of the best testing practices as dictated by each measurement situation. However, the procedures set forth herein must be followed to the greatest extent possible. All deviations must be documented in each individual case and maintained with the sample data. The QA Manual (QAM) and all Standard Operating Procedures will be reviewed no less than annually.

Appropriate use of data generated under the varying conditions encountered in environmental analyses requires reliance on the quality control practices incorporated into the procedures. Although the EPA, state environmental protection departments, The NELAC Institute (TNI), AIHA LAP, other regulatory agencies, and clients require the use of approved methods for sampling and analysis, the mere approval of these procedures does not guarantee adequate results. Inaccuracies can result from many causes, including matrix effect, equipment malfunction, and operator error. Therefore, the quality control component of each method is indispensable and cannot be compromised.

This manual delineates the elements of the QA Program that must be implemented by all sections of the lab. These requirements outlined are the minimum requirements. Method-specific procedures and project-specific Quality Assurance Project Plans (QAPP) may require more stringent QA requirements.

### 3.3 Definitions

- 3.3.1 Quality Assurance (QA) is the total program for assuring reliability of the monitoring and measurement of data. It comprises all those planned and systematic actions necessary to provide adequate confidence that all aspects of laboratory service programs are performed in a manner satisfactory to EETSE Atlanta management and to the needs of its customers.
- 3.3.2 Quality Control (QC) is the routine application of procedures for obtaining prescribed standards of performance in the monitoring and measurement process. It covers the operational procedures, techniques, and activities that provide the means to measure, evaluate and document the quality of data obtained in the laboratory. The QC Program specifies the minimum practices, which shall be used to assure that data is produced of a known and defensible quality and within acceptable limits.

### 3.4 Fields of Testing

This manual covers methods for the analysis of aqueous, solid, waste, and air matrices currently on EETSE Atlanta scopes of accredited testing for AIHA LAP, Florida DOH, The NELAC Institute (TNI), North Carolina DENR and South Carolina DHEC. A detailed list of test methods and analytes may be found in Section 5.0, which defines the minimum level of quality assurance/quality control needed to meet required specifications. All methods carried out by EETSE Atlanta shall meet these stipulations as appropriate. In some instances, quality assurance project plans (QAPPs), project specific data quality objectives (DQOs), or local regulations may require criteria other than those stated. In these cases, the laboratory will abide by the more stringent criteria, following a review and acceptance of the requirements by the Laboratory Manager and the Quality Assurance Manager.

### 3.5 Management of the Quality Assurance Manual

This manual was prepared in accordance with the current The NELAC Institute (TNI) standards and AIHA LAP requirements. It also follows guidelines set by the U.S. Environmental Protection Agency, Florida DOH and ISO/IEC 17025. Tests are always carried out in accordance with stated methods and customers' requirements. Further, the laboratory can be legally responsible as it carries out testing in such a way to meet the requirements of this International Standard and to satisfy the needs of the customer, the regulatory authorities or organizations providing recognition. The management system shall cover work carried out in the laboratory's permanent facilities.

- 3.5.1 The QA manual is reviewed annually by the Quality Assurance Manager and laboratory personnel to confirm that it reflects current in-house practices and meets all the requirements of both EETSE Atlanta's clients and accrediting agencies. Modifications may be made in order to correct inconsistencies, implement improvements, encompass new concepts or procedures, adapt to new regulations, or update any changes in state or national policies or standards. The Quality Assurance Manager, Laboratory Manager, Technical Director, and relevant operational staff review the changes before they are integrated into the QA manual.
- 3.5.2 Policies or procedures in the manual which demand immediate attention are addressed through the use of temporary and permanent Interim Change Notices as described in Section 8.

### 3.6 Control of the Quality Assurance Manual

The Quality Assurance Manual is considered confidential within Eurofins Environment Testing Southeast, LLC., Atlanta. It may not be altered in any manner by anyone other than the Quality Assurance Manager, the Laboratory Manager, or an employee duly appointed by either of the aforementioned. The manual shall be marked as an "Uncontrolled Copy" if provided to external users or regulators. It is intended for the exclusive purpose of the review of EETSE Atlanta's quality systems and shall not be used in any other way without written permission of the Business Unit Manager, Laboratory Manager, or Quality Assurance Manager.

### 3.7 Order of Precedence

In the event of a conflict or discrepancy between policies, the order of precedence shall be as follows:

1. Eurofins Atlanta Interim Change Notice
2. Quality Assurance Manual
3. Standard Operating Procedures
4. Other (memos, charts, published methods, etc.)

## 4.0 ORGANIZATION AND RESPONSIBILITY

- 4.1 Organization: Eurofins Environment Testing Southeast, LLC. Atlanta (EETSE Atlanta) was established in 1992 in Atlanta, Georgia, an environmental testing laboratory dedicated to providing superior quality data. The laboratory is one of the largest independent environmental laboratories in the Southeast comprised of highly skilled scientists and experts in the field of environmental testing who are dedicated to providing superior quality analytical data.

The professionals at the laboratory perform chemical and biological testing on a variety of environmental samples. These include solid waste matrices, soils, sediments, fibrous wastes, polymeric emulsions, filter cakes, spent carbons, spent catalysts, air sampling media, ground, surface and waste waters, aqueous sludges, caustic liquors, acid liquors, waste solvents, oily wastes, and tars.

- 4.2 Organizational Structure: The relationship between management, technical operations, support services and quality system is as follows: Laboratory Operations, Quality Assurance Department, Technical Director, and Customer Service Department report to the Business Unit Manager, who in turn reports to the company President. The organizational structure of EETSE Atlanta provides for an independent Quality Assurance Department with the overall responsibility of developing and auditing for compliance to a comprehensive Quality Assurance Program. The QA Department has the authority and organizational freedom to ensure that QA activities are implemented and accomplished. The Quality Assurance Manager reports directly to the Business Unit Manager of EETSE Atlanta.

- 4.2.1 Because of the breadth of knowledge required to produce quality data, the cooperation of numerous individuals is required. All assigned personnel shall remain diligent to identify, report, and promptly rectify issues or events affecting data quality as they occur. To encourage the identification of these situations, management at all levels shall promote continuous quality improvement throughout the entire company. These events and their resolutions must be verified and substantiated as required by this document and any other applicable QA guidelines.

Laboratory personnel have the authority and resources to carry out their duties, which include

- implementation, maintenance and improvement of the management system
- identification of deviations from the management system or from laboratory procedures
- initiation of actions to prevent or minimize such deviations
- reporting the effectiveness of the management system and laboratory activities
- Identifying needs for improvement

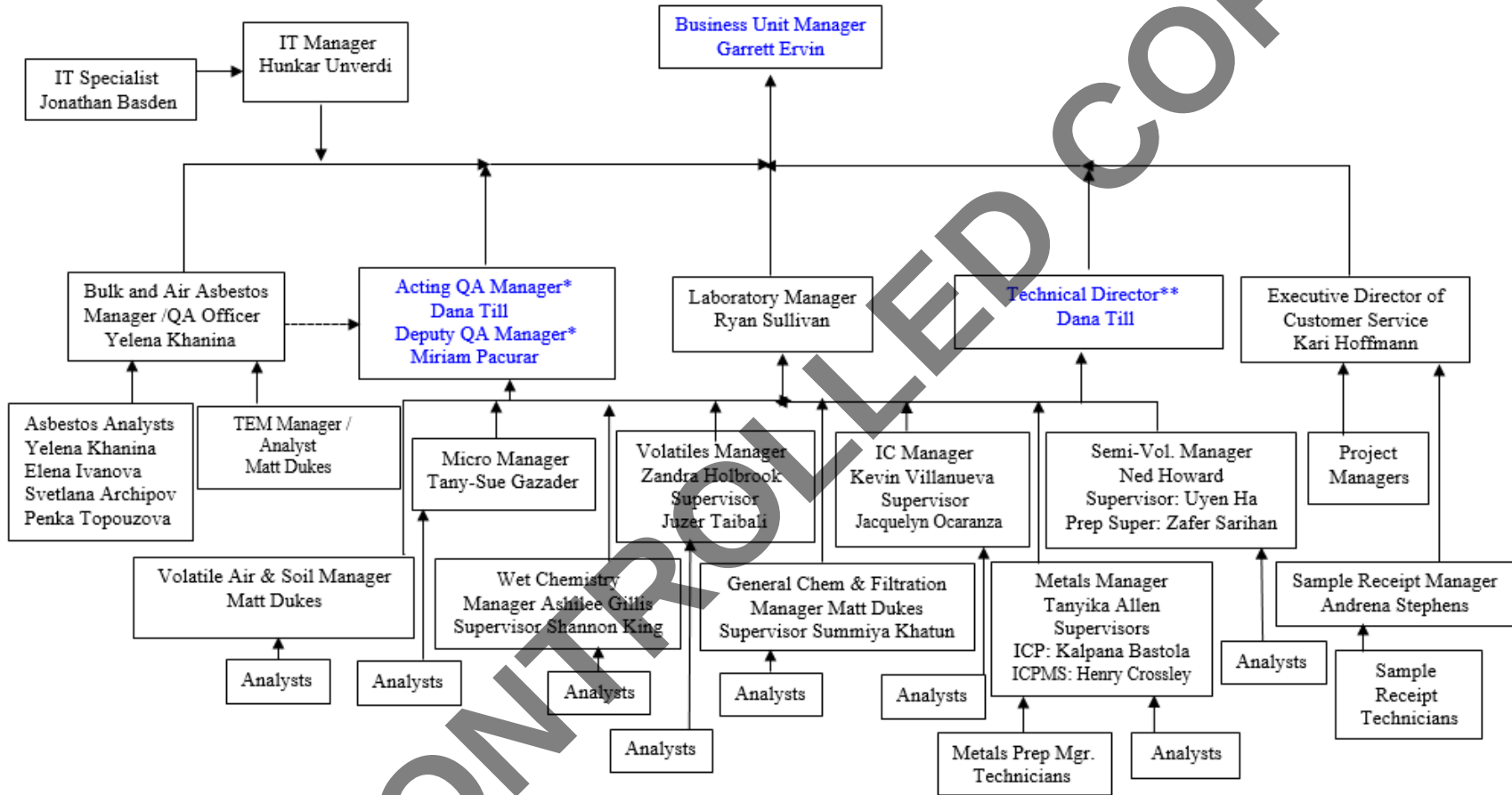
- 4.2.2 The establishment of a Quality Assurance Program requires the services of all the employees of EETSE Atlanta in order to carry out the monitoring, record keeping, statistical techniques, and other functions required by the system. This total commitment of all personnel to the production and reporting of reliable data is dependent upon the conscientious effort of everyone involved. It is important, therefore, that each member of the organization have a clear understanding of his duties, responsibilities, and relationship to the total effort.

#### 4.3 Organizational Chart

The organizational structure at EETSE Atlanta is documented in the form of an Organizational Chart, Figure 4-1, which identifies personnel involved in the production of quality data. Lines of communication and responsibility exist throughout the entire company. Employees are provided routine communication in the form of training, lectures, meetings, and emails to focus on customer needs, regulatory requirements and to maintain an effective management system. This communication and internal monitoring allows for the integrity of the management system to be maintained when changes are implemented.

UNCONTROLLED COPY

**FIGURE 4-1  
 ORGANIZATIONAL CHART**



\*TNI: The QA Managers will serve as deputy in the event of the Technical Director's absence.

\*\*TNI: The Technical Director will serve as deputy in the event of the QA Managers' absence.

For AIHA-LAP LLC accreditation: The Laboratory Technical Director will serve as deputy for the IHLAP and ELLAP Technical Manager. The Laboratory Technical Director will also serve as deputy for the IHLAP and ELLAP Quality Assurance Manager. The Laboratory Quality Assurance Manager will serve as deputy for the EMLAP Microbiology Technical Manager and the Microbiology Quality Assurance Coordinator.



## 4.4 Responsibilities and Position Requirements

It is the responsibility of all EETSE Atlanta employees to implement the Quality Assurance Program effectively. The roles and responsibilities of the technical management and the Quality Assurance Manager to ensure compliance with the regulatory standards (including AIHA LAP and NELAC) are outlined in the position descriptions below. All chemists and technicians are responsible for understanding and following the measures of the QA program, and for reporting any quality failures to a Manager or Supervisor in a timely manner. Supervisors and Managers are responsible for ensuring that all laboratory personnel are familiar with the requirements of the Quality Assurance Program and that these requirements are implemented and maintained. It is the responsibility of the Supervisor to ensure that all laboratory personnel are trained to perform their assigned tasks. It is the responsibility of each Supervisor to ensure that any quality failures are reported to the Quality Assurance Department immediately.

The essential personnel involved in the implementation of and/or monitoring of the Quality Assurance Program are identified in the following sections.

### 4.4.1 Business Unit Manager

The **Business Unit Manager** is responsible for the overall operation of the laboratory and reports directly to the company President. The Business Unit Manager ensures that all of the resources are available to implement and follow the procedures and policies as written in the EETSE Atlanta QA Manual for compliance with The NELAC Institute (TNI) Standards, National Voluntary Laboratory Approval Program (NVLAP), AIHA LAP International Standard, Georgia EPD, North Carolina, and South Carolina rules and regulations. The Business Unit Managers reviews, approves the EETSE Atlanta Quality Assurance Manual, and authorizes the Quality Assurance Manager to perform internal audits on behalf of the company.

The Business Unit Manager will conduct the annual management review of laboratory operations to assess the effectiveness of policies and procedures in order to implement changes where deemed necessary. The agenda of the annual meeting will include reports from all department supervisors and cover such topics as quality assurance, accreditations, documentation, changes in the laboratory, equipment and maintenance needs, results of audits etc. The topics to be discussed will be determined by the Business Unit Manager, Laboratory Manager, and Quality Assurance Manager. A current list of topics is presented in Attachment 4.

### 4.4.2 Laboratory Manager

The Laboratory Manager is responsible for the daily operations within the analytical sections of the laboratory. If the Laboratory Manager is absent for a period of time exceeding 15 consecutive calendar days, the Business Unit Manager must designate another full-time staff member meeting the qualifications of the Laboratory Manager to temporarily perform this function. In case of a change of Laboratory Manager, all necessary, accrediting authorities must be notified in writing within thirty days. The following is the position description for Laboratory Manager:

#### Position Description and Requirements

Position Title: Laboratory Manager

Position Description: This position is responsible for the following:

- Oversees the daily operations of the laboratory.
- Ensures that client specific reporting & quality control requirements are met.
- Works with the Project Managers and Department Managers to ensure project objectives are met in a timely manner.



- Sets goals and objectives for both the business and the laboratory employees.
- Provides direction to departmental managers to steer all departmental efforts toward the overall corporate production goals.
- Discusses and resolves disagreements, as necessary, with laboratory personnel.
- Coordinates any unresolved concerns between the project managers and the departmental supervisors.
- Ensures that all analysts and supervisors have the appropriate education & training to properly carry out the duties assigned to them, and ensures that this training has been documented.
- Ensures that a sufficient number of qualified personnel are employed to supervise and perform the work of the laboratory.
- Ensures that HR policies are adhered to and maintained.
- Ensures management's commitment to compliance with The NELAC Institute (TNI) Standards
- Ensures compliance with International Standard ISO/IEC 17025
- Hires key personnel and recruits professional talent.
- Reviews and approves all SOPs prior to their implementation and ensures all approved SOPs are implemented and adhered to.
- Schedules analytical operations.
- Supervises the maintenance of instruments and the scheduling of repairs.
- Ensures that appropriate corrective actions are taken to address analyses as requiring such actions by internal & external performance or procedural audits.
- Ensures that personnel are free from any commercial, financial or other undue pressures that which adversely affect the quality of their work.
- Supervises the preparation & maintenance of laboratory records.
- Responsible for holding documented meetings as needed with the departmental supervisors.

**Position Requirements:** BA or BS in Chemistry, Microbiology, Biology, Environmental Science or other related degree. Must have 2-5 years of experience of as duties described above.

#### 4.4.3 Quality Assurance Manager Positions

##### 4.4.3.1 Acting Quality Assurance Manager

The QA Manager is responsible for establishing a Quality Assurance Program that meets the quality assurance objectives of the company, and its clients. If the QA Manager is absent for a period of time exceeding 15 consecutive calendar days, the Business Unit Manager must designate another full-time staff member meeting the qualifications of the QA Manager to temporarily perform this function. In case of a change of QA Manager, all necessary accrediting authorities must be notified in writing within thirty days. The following is the position description for Quality Assurance Manager:

#### Position Description and Requirements

Position Title: Quality Assurance Manager

Position Description: This position is responsible for the following:

- Directs all corporate quality assurance (QA).
- Responsible for developing and maintaining all QA systems and documentation.
- Responsible for all aspects of the State and Federal Certification processes.
- Maintains records of acceptable performance of MDLs.
- Directs management to compliance to the AIHA LAP Accreditation Policies
- Directs management to compliance with The NELAC Institute (TNI) Standards

- Ensures compliance with International Standard ISO/IEC 17025
- Has authorization from company Business Unit Manager to conduct internal audits
- Maintains all quality control charts.
- Has direct access to the Technical Director and to the highest level of management where decisions are made on laboratory policy and resources.
- Serves as focal point for QA/QC; has responsibility for the oversight and review of QC data.
- Functions independently from laboratory operations for which QA oversight is held.
- Evaluates data objectively and performs assessments without outside influence.
- Performs periodic reviews of test reports under AIHA LAP according to the LQSR.
- Conducts internal audits on the entire laboratory technical operation annually.
- Notifies laboratory management of deficiencies in the quality system and monitors corrective action.
- Maintains currency of the QA manual.
- Responsible for preparing/submitting a quarterly report to upper management.
- Serves as deputy in the event of the Technical Director's absence.

Position Requirements: Must have a BA or BS in Chemistry, Microbiology, Biology, Environmental Science or any other related degree. Must have 2-5 years of experience carrying out the duties described above.

## 4.4.3.2 Deputy Quality Assurance Manager

Acting and Deputy Quality Assurance Managers for EETSE Atlanta are responsible for establishing a Quality Assurance Program that meets the quality assurance objectives of the company and its clients. They direct all corporate quality assurance, develop and maintain all QA systems and documentation, and are responsible for all aspects of the State and Federal Certification process. They function independently from laboratory operations for which QA oversight is held to objectively evaluate data and perform assessments without outside influence. Additionally, they maintain currency of the QA Manual, conduct internal audits on the entire laboratory technical operation and maintains all quality control charts.

Also, Deputy Quality Assurance Manager takes on many of the duties of the Quality Assurance Department. This includes administration of accreditations, management of the proficiency testing programs, oversight of routine laboratory controls (such as thermometer, pipettor, and balance calibrations), monitoring of in-house QA Department projects and studies, tracking and posting of various QA correspondence and documentation, performance of internal audits, addressing Risk Management and QA Department Corrective Action Reports, Quality Assurance training, and the administration of annual MDL studies.

## 4.4.4 Department Director (If Applicable)

The Department Director reports to the Business Unit Manager / Laboratory Manager and is responsible for the administrative functions within the assigned department(s). This includes but is not limited to non-production activities such as monitoring Demonstrations of Capabilities, oversight of Standard Operating Procedure updates, Method Detection Limits Studies, as well as departmental instrument maintenance and quality assurance assignments. In addition, the Department Director is responsible for assuring adequate staffing and training. The following is the position description for Department Director:

## Environment Testing

### Position Description and Requirements

Position Title: Department Director (When Applicable)

Position Description: This position is responsible for the following:

- Oversees the daily operations of the laboratory.
- Ensures that client specific reporting & quality control requirements are met.
- Works with Project Managers/Group Leaders to ensure project objectives are met in a timely manner.
- Sets goals and objectives for both the business and the laboratory employees.
- Provides direction to departmental managers to steer all departmental efforts toward the overall corporate production goals.
- Discusses and resolves disagreements, as necessary, with laboratory personnel.
- Coordinates any unresolved concerns between the project managers & the departmental supervisors.
- Ensures that all analysts and supervisors have the appropriate education & training to properly carry out the duties assigned to them, and ensures that this training has been documented.
- Ensures that a sufficient number of qualified personnel are employed to supervise and perform the work of the laboratory.
- Ensures that HR policies are adhered to and maintained.
- Ensures management's commitment to compliance with The NELAC Institute (TNI) Standards
- Hires key personnel and recruits professional talent.
- Reviews and approves all SOPs prior to their implementation and ensures all approved SOPs are implemented and adhered to.
- Schedules analytical operations.
- Supervises the maintenance of instruments and the scheduling of repairs.
- Ensures that appropriate corrective actions are taken to address analyses as requiring such actions by internal & external performance or procedural audits.
- Ensures that personnel are free from any commercial, financial or other undue pressures that which adversely affect the quality of their work.
- Supervises the preparation & maintenance of laboratory records.
- Responsible for holding documented meetings as needed with the departmental supervisors.

Position Requirements: A Degree or the necessary experience to achieve the requirements outlined in the position description. Must have 2-5 years of experience carrying out the duties described above.

#### 4.4.5 Technical Director

The Technical Director exercises daily supervision of laboratory procedures and the reporting of results. If the Technical Director is absent for a period of time exceeding 15 consecutive calendar days, the Business Unit Manager must designate another full-time staff member meeting the qualifications of the Technical Director to temporarily perform this function. In case of a change of Technical Director, all necessary accrediting authorities must be notified in writing within thirty days. The following is the position description for Technical Director:

### Position Description and Requirements

Position Title: Technical Director

Position Description: This position is responsible for the following:

- Updates SOPs as required.
- Maintains Test Codes
- Ensures that all employees are properly trained

- Reviews and approves revisions to the Quality Assurance Manual.
- Maintains records of employee training including acceptable performance of IDOCs.
- Provides technical assistance in the development of new methods.
- Responsible for following direction given by the Business Unit Manager.
- Ensures management's commitment to compliance with The NELAC Institute (TNI) Standards
- Ensures compliance with International Standard ISO/IEC 17025
- Provides technical guidance to analytical staff.
- Assists with internal and external audits.
- Ensures that appropriate corrective actions are taken to address analyses identified as requiring such actions by internal and external performance or procedural audits.
- Oversees equipment maintenance and repair.
- Assists the Laboratory Manager in the investigation of new technologies and proposed equipment acquisitions by the laboratory.
- Serves as deputy in the Quality Manager's absence.

**Position Requirements:** A Bachelor's Degree in chemical, environmental, biological, or physical sciences or engineering, with at least 24 college semester credit hours in chemistry and at least two years of experience in the environmental analysis of representative inorganic and organic analytes for which the laboratory seeks or maintains accreditation. A Masters or Doctoral Degree may be substituted for one year of experience.

## 4.4.6 Microbiology Lab Manager

Microbiology Lab Manager reports to the Lab Manager on all aspects of sample processing. The Microbiology Lab Manager is responsible for managing Microbiology Analysts.

### Position Description and Requirements

**Position Title:** Microbiology Lab Manager

**Position Description:** This position is responsible for the following:

- Training and qualification of personnel (under their supervision) on procedures.
- Monitors necessary protocols and standard operating procedures, including control charts.
- Maintains QC within their area of responsibility.
- Ensures that personnel (under their supervision) use approved procedures, and maintain all QC.
- Recommends and implements new or revised QC policies as approved by the QA Manager.
- Assists in reviewing departmental requirements and monitoring maintenance requirements.
- Reviews data and QC results, and reports non-conformances to the appropriate QA Manager, Technical Manager, and/or Business Unit Manager.
- Provides guidance to analysts in resolving problems encountered daily during sample preparation and analysis, in conjunction with the Technical Director or Quality Assurance Manager.
- Ensures all logbooks are maintained and current.
- Maintains adequate and valid inventory of reagents, standards, spare parts, and other relevant resources required to perform daily analysis.
- Assists Technical Director with Demonstrations of Capability.

**Position Requirements:** A Degree (typically Microbiology, Biology or equivalent) or the necessary experience to achieve the requirements outlined in the position description.

### 4.4.7 Microbiology Analyst

The Microbiology Analyst training required is described in detail in the Employee Training Files maintained by the Technical Director.

#### Position Description and Requirements

Position Title: Microbiology Analyst

Position Description: This position is responsible for the following:

- Performs analyses by adhering to analytical and quality control protocols prescribed by SOPs, the QA manual, and project specific requirements (e.g. data packages).
- Documents standard and sample preparation, instrument maintenance, calculations, and any observed non-conformances on work lists, bench sheets, or laboratory logbooks.
- Reports all out-of-control situations, instrument problems, matrix problems, and QC failures, which might affect the reliability of the data, to their respective supervisors or the QA Manager.
- Reviews data generated and submits it to the departmental supervisor prior to entering and submitting the data to the next level of review.

Position Requirements: At a minimum, analysts must have a high school diploma or equivalent or the necessary experience to meet the requirements of the position description.

### 4.4.8 Technical Assistant

The Technical Assistant reports directly to the Technical Director and assists with the implementation and maintenance of all programs assigned to the Technical Director.

#### Position Description and Requirements

Position Title: Technical Assistant

Position Description: This position is responsible for the following:

- Schedules, tracks and provides preliminary document review for DOC studies.
- Performs SOP updates as instructed from Tech. Director.
- Maintains SOP document control system.
- Scans and publishes completed documents to Portal Server for archiving.
- Schedules and documents training sessions and staff meetings held by Tech. Director.
- Assists Tech. Director with development of training program content and media.
- Assists Tech. Director with day-to-day functions of the Tech. Direction Dept. as needed.

Position Requirements: A Bachelors Degree in a science or engineering based major.

### 4.4.9 Director of Project Management

The Director of Project Management serves as a liaison between the laboratory and its clients ensuring the delivery of reports and data packages. The following is the position description:

#### Position Description and Requirements

Position Title: Director of Project Management

Position Description: The Director of Project Management serves as a liaison between the laboratory and its clients, and ensures delivery of data packages. Responsibilities include:

- Meets client specifications by communicating project and QA requirements to the laboratory.
- Assigns project managers.
- Notifies laboratory personnel of incoming projects and sample delivery schedules and requirements.



- Monitors status of data package projects in-house to ensure timely and accurate delivery of reports.
- Informs clients of data package related problems and resolves service issues.
- Coordinates requests for sample containers and other services such as data packages.
- Reviews and approves, with input from the Business Unit Manager, proposals for marketing.
- Reviews laboratory data reports and quotes.

Position Requirements: A Degree or the necessary experience, 2 years management or supervisory experience, strong computer and personnel skills, knowledge of the environmental and chemical sciences, and previous project management experience.

#### 4.4.10 Project Manager

The Project Manager is responsible for directly ensuring that the individual client's needs are met on a project-by-project basis with respect to the laboratory's QA program and any project-specific QA programs. The Project Manager is responsible for disseminating any project-specific information to the Laboratory Manager and/or Laboratory Director. Non-routine QA requirements must be approved by the Laboratory Director and Laboratory Manager. The following is the position description for Project Manager:

##### Position Description and Requirements

Position Title: Project Manager

Position Description: This position is responsible for the following:

- Ensures effective and accurate communication between the client and the laboratory.
- Handles all client requests and needs.
- Utilizes any corporate documents to consult with clients about client questions or concerns.
- Responsible for notifying the Director of Project Management of any client activities that entail services that are not currently performed by EETSE Atlanta.
- Assesses client requests with consultation with the Director of Project Management.
- Develops and maintains client records and requirements.
- Ensures that the laboratory is aware of, and completes, all client requests and requirements.
- Responsible for meeting with the Marketing Manager, Director of Project Management, and Business Unit Manager on a periodic basis for marketing purposes.
- Communicates proper sampling, shipping, and receiving procedures to clients.
- Documents client interaction and maintains client information in the Project Management System.
- Reviews and approves data reports prior to their release to the clients.
- Ensures client specific reporting and quality control requirements are met.

Position Requirements: A Degree or the necessary experience to achieve the position requirements outlined in the Position Description.

#### 4.4.11 Department Manager

Oversees operation of departments, supervises employees, & addresses issues in the departments

##### Position Description and Requirements

Position Title: Department Manager

Position Description: This position is responsible for the following:

- Supervise employees to ensure they are working to full potential and being productive at all times.

- Handle all personnel issues, i.e. conflict between workers, inappropriate behavior, schedule changes, time-off requests, etc...
- Write warnings if needed.
- Ensure employee's time sheets reflect actual work schedule.
- Make sure clock in-out times are accurate.
- Make sure employees are coming to work at the designated time.
- Monitor employee breaks.
- Assign tasks to personnel using the Task Management software.
- Grade task upon completion, this is to be included in the employee's Performance Evaluation.
- The use of this software will also be used in performing supervisor's Performance Evaluation.
- Perform Employee Performance Evaluations on all employees in department.

### Production responsibilities:

- Maintain backlog to ensure all samples are completed within holding time, due date, and that all special requirements are met.
- Keep track of inventory and order supplies as needed.
- Sufficient amounts of reagents, solvents, standards, etc... must be kept at all times so production is not affected because of a shortage of supplies.
- Identify and solve problems within the department including, but not limited to equipment, tests performed, and any other issues resulting from the preparation/analysis of samples.
- A supervisor is required to stay until problems are solved or rush work is completed to within a reasonable amount of time or hour (this includes staying late and working weekends.)
- Delegate work to employees.
- Assign batches and/or tests.
- Assign new tests to employees so workload can be spread evenly among staff.
- Assign duties to employees, i.e. ordering of supplies, logging in new supplies, etc...

### QA Responsibilities:

- Ensure all employees are properly trained and DOC's performed.
- Ensure all CDOC's are performed on a yearly basis for all employees and for all tests.
- Ensure MDL's are completed/prepped yearly, more often where applicable, or as needed due to instrument changes/maintenance.
- Complete PT samples in a timely manner and identify any issues with test as soon as possible.
- If necessary, coordinate preparing/running of Proficiency samples with associated departments to ensure their timely completion and enough samples remain for all tests.
- QA review any data generated within department.
- [Assists in reviewing departmental requirements and monitoring maintenance requirements.](#)
- Review and revise SOP's when necessary.
- Ensure batches, logbook pages, raw data, & paperwork are scanned & posted to the Portal Server.

Position Requirements: A Bachelor's Degree preferably in chemical, environmental, biological, physical sciences, engineering, or other scientific discipline and at least two years of experience in the environmental analysis similar to that which will be overseen.



### 4.4.12 Supervisors

Assists with operation of departments and supervision of employees and report to the managers.

#### Position Description and Requirements

Position Title: Supervisors

Position Description: Supervisors report to their respective Manager on all aspects of sample processing. If a section does not have a supervisor, the Manager of that section functions as the supervisor. The Supervisor's responsibilities include, when applicable:

- Training and qualification of personnel (under their supervision) on procedures.
- Monitors necessary protocols and standard operating procedures, including control charts.
- Maintains QC within their area of responsibility.
- Ensures that personnel (under their supervision) use approved procedures, maintain all instrument QC.
- Recommends and implements new or revised QC policies as approved by the QA Manager.
- Assists in reviewing departmental requirements and monitoring maintenance requirements.
- Reviews all data and QC results, and reports non-conformances to the appropriate QA Manager, Technical Manager, and/or Business Unit Manager.
- Provides guidance to analysts in resolving problems encountered daily during sample preparation and analysis, in conjunction with the Technical Director or Quality Assurance Manager.
- Ensures all logbooks are maintained and current.
- Maintains adequate and valid inventory of reagents, standards, spare parts, and other relevant resources required to perform daily analysis.
- Assists Technical Director with MDLs and IDOCs.

Position Requirements: Degree or the necessary experience to achieve the requirements outlined in the position description. Two plus years of experience considered in lieu of a degree.

### 4.4.13 Analysts

Analysts are responsible for performing the various testing, digestive, and extractive procedures required in the laboratory.

#### Position Description and Requirements

Position Title: Analysts

Position Description: Each type of analyst position and the specific training required is described in detail in the Employee Training Files maintained by the Technical Director. In general, analysts are responsible for the following duties:

- Performs analyses by adhering to analytical and quality control protocols prescribed by SOPs, the QA manual, turnaround times, rush analyses and short hold analyses, and project specific requirements (e.g. data packages).
- Documents standard and sample preparation, instrument calibration and maintenance, calculations, and any observed non-conformances on work lists, bench sheets, or laboratory notebooks.
- Reports all out-of-control situations, instrument problems, matrix problems, and QC failures, which might affect the reliability of the data, to their respective supervisors or the QA Manager.
- Reviews all data generated prior to entering and submitting the data to the next level of review.
- Suggests method improvements to their supervisor, Technical Director, or the QA Manager for potential incorporation into SOPs.

Position Requirements: At a minimum, analysts must possess a high school diploma or equivalent. If the analyst operates equipment, the analyst must satisfactorily complete a short course

## Environment Testing

offered by an equipment manufacturer, professional organization, university, or other qualified training facility (in-house training is acceptable).

### 4.4.14 Project Manager Assistant

Project Manager Assistants are responsible for providing assistance to project managers with the production and completion of data packages.

#### Position Description and Requirements

Position Title: Project Manager Assistant

Position Description: Project manager assistants report to the project managers. This position is primarily responsible for assisting project managers with on time completion of all data packages and to ensure effective and accurate communication between lab and project managers with respect to data package status. In general project manager assistants are responsible for the following duties:

- Assigns data packages and completion deadlines to appropriate lab departments.
- Responsible for initial data package review after data package was completed by lab departments
- Responsible of notifying project managers or Director of Project Management of any internal problems or discrepancies that may affect data package on time completion.
- Responsible for formatting data package (inserting dividers, making table of contents, copying reports, COC and checklist, putting all data in appropriate order, etc);
- Responsible for setting bookmarks and creating CD ROM's, completing and updating data package status document (located on the EETSE Atlanta Server) on the daily basis, and ensures that data package was scanned or copied after approved by the project manager

Position Requirements: A Degree or the necessary experience to achieve the requirements outlined in the position description.

### 4.5 Improper, Unethical, or Illegal Actions; Data Integrity System; and Confidentiality of Client Information and Proprietary Rights

- 4.5.1 It is recognized that the quality assurance program is an inherent function involving all of the organizational components and personnel. The achievement of quality objectives is attained by each individual performing assigned work in strict compliance with approved and applicable requirements and procedures.
- 4.5.2 For a quality assurance program to succeed, it is imperative that all employees adhere to procedures which detect and prevent improper, unethical, or illegal actions which could in any way compromise the reliability and data integrity. Training in legal, ethical, data integrity, and confidentiality of client information and proprietary rights responsibilities is mandatory. Records are maintained that document, through individual signatures, that every employee understands the consequences of improper, unethical, or illegal actions related to data integrity. Potential instances of improper, unethical, illegal actions or Data Integrity issues will be discussed and addressed in senior management meetings.

The laboratory will inform the clients, of the information it intends to place in the public domain. Except for information that the customer makes publicly available, or when agreed between the laboratory and the customer (e.g. for the purpose of responding to complaints), all other information is considered proprietary information and shall be regarded as confidential. Personnel acting on the laboratory's behalf, shall also keep confidential all information obtained or created during the

performance of laboratory activities, except as require by law. The laboratory is responsible for management of all information obtained or created during the performance of laboratory activities. Information about the customer obtained from sources other than the customer (e.g. complainant, regulators) shall be confidential between the customer and the laboratory. The provider (source) of this information shall be confidential to the laboratory and shall not be shared with the customer, unless agreed by the source.

- 4.5.3 Improper actions are defined as deviations from method-specified or client-specified analytical or quality assurance practices. These events may be intentional or unintentional. Disciplinary measures may include verbal warnings, written warnings, and/or dismissal.
- 4.5.4 Unethical or illegal actions are defined as the deliberate falsification or alteration of analytical or quality assurance results where failed method, quality control, or client specifications are made to appear acceptable. These actions affect the integrity of the data. Also included as unethical or illegal actions is the falsification and reporting of data where analyses were never performed. Disciplinary measures may include verbal warnings, written warnings, and/or dismissal. Findings of fraud may be prosecuted to the fullest extent of the law.
- 4.5.5 Employee training of legal, ethical, and data integrity responsibilities establishes the program and procedures that prevent and detect improper, unethical, or illegal actions by employees. Deterrence begins with a position of zero tolerance established by management. Employee training supports and sustains the policy.
  - 4.5.5.1 Training of laboratory employees with respect to their legal and ethical responsibilities is comprised of three basic components:
    - 4.5.5.1.1 The definition of improper, unethical, or illegal actions.
    - 4.5.5.1.2 The elements of the laboratory's prevention and detection program.
    - 4.5.5.1.3 Some examples of inappropriate laboratory practices that affect data integrity.
  - 4.5.5.2 Training courses in legal and ethical responsibilities also include the potential punishments and penalties for fraudulent conduct.
- 4.5.6 Laboratory management implements a variety of proactive measures to promote the prevention and detection of improper, unethical, or illegal activities. Minimum requirements are included in the quality program by means of the following:
  - 4.5.6.1 An ethics and data integrity policy that is read and signed by all personnel.
  - 4.5.6.2 Initial and annual ethics and data integrity training.
  - 4.5.6.3 Internal audits.
  - 4.5.6.4 Anti-fraud language in client contracts and project agreements, where applicable.
  - 4.5.6.5 Analyst notation and signature on manual integration changes to data and/or calculations.
  - 4.5.6.6 Mandatory use of electronic and computer software audit functions wherever possible.
  - 4.5.6.7 A no-fault policy encourages employees to come forward and report fraudulent activities.

- 4.5.7 Employees are provided routine communications in the form of training, lectures, and updates in policy that are intended to reduce illicit behavior.
- 4.5.8 Any of the following means may be used to monitor the quality and validity of test results:
- 4.5.8.1 Internal quality control samples.
  - 4.5.8.2 Interlaboratory comparisons or proficiency test studies.
  - 4.5.8.3 Certified reference materials or internal quality control using secondary reference materials.
  - 4.5.8.4 Replicate tests using the same or different methods.
  - 4.5.8.5 Re-testing of retained samples.
  - 4.5.8.6 Correlation of results for different characteristics of a sample.
- 4.5.9 Examples of inappropriate practices include the following:
- 4.5.9.1 Failure to properly record and preserve data: Analysts must be able to clearly demonstrate how analytical values were obtained from the associated raw data. Such documentation shall be maintained by the laboratory and be available to data users or auditors at any time. This includes failure to document data in the original logbook or on the original company form. Transferring data from a scratch paper or note paper to the logbook or company form is never allowed. The data must be recorded in the appropriate document at the time the test or preparation is being performed by the person performing the test. Failure to comply with this will result in disciplinary measures up to and including dismissal.
  - 4.5.9.2 Failure to properly document errors: All errors, mistakes, and justifications for manual integrations must be fully explained within the case narrative of the final report.
  - 4.5.9.3 Failure to initiate corrective actions: Analysts having knowledge of any part of an analysis or procedure that requires corrective action must immediately notify management.
  - 4.5.9.4 Failure to report a missed holding time: Samples analyzed outside of allowed holding times must not be reported without qualifying the data, and some results may be unusable due to lack of validity. Backdating an analysis to save a missed hold time is forbidden.
  - 4.5.9.5 Failure to follow methods or SOPs as written: Methods and standard operating procedures must be followed without deviation. Analysts must immediately submit any changes to the Technical Director for revisions.
  - 4.5.9.6 Signing another person's signature to documentation.
- 4.5.10 Improper, unethical, and illegal actions are considered fraudulent because they affect the integrity of the data. Gross deviations from specified procedures will be investigated for potential improper, unethical, illegal actions and data integrity issues. Findings of fraud may be prosecuted to the fullest extent of the law. The following are examples of improper, unethical, and illegal conduct that affect data integrity:
- 4.5.10.1 Improper use of manual integrations to meet calibration or method Quality Control criteria, such as peak shaving or peak enhancement, if performed solely to meet QC requirements.
  - 4.5.10.2 Falsification of results to meet method requirements.
  - 4.5.10.3 Reporting of results without analyses to support the data or reporting results from the analysis of one sample for those of another.

- 4.5.10.4 Selective exclusion of data to meet QC criteria, such as dropping calibration points without technical or statistical justification.
- 4.5.10.5 Misrepresentation of laboratory performance by falsifying calibration data or QC.
- 4.5.10.6 Citing matrix interference as a basis for exceeding acceptance limits, especially without initiating corrective actions, in interference-free matrices.
- 4.5.10.7 Unwarranted manipulation of computer software such as subtracting or not subtracting a blank or background, altering chromatographic baselines, or improper background subtraction (GC/MS) to comply with ion abundance criteria in to meet QC requirements.
- 4.5.10.8 Improper alteration of analytical conditions, such as modifying an EM voltage or changing a GC temperature program to induce a shorter analytical run time, which makes the standard analysis different from the sample analysis.
- 4.5.10.9 Misrepresentation of QC samples, such as adding surrogates after sample extraction, omitting sample preparation steps for QC samples, over-spiking, or under-spiking.
- 4.5.11 The Data Integrity System (a.k.a. Legal & Ethical Training SOP) is reviewed annually as part of the annual management review.
- 4.5.12 To ensure confidentiality of data integrity issues, a chain of command policy has been adopted. Employees are encouraged to bring data integrity issues to their immediate supervisor. If the supervisor is a part of the data integrity issue, then the employee brings the issue to the Laboratory Manager, who is part of upper management. In the absence of the Laboratory Manager, the issue is brought to either the Quality Assurance Manager or the Technical Director. A confidential meeting with the Human Resources Manager may take place to resolve the issue. Discussions will take place outside the laboratory and in upper management's office(s) to again help ensure confidentiality.
- 4.5.13 Employees are also trained the importance of Confidentiality of Client Information and Proprietary Rights. Employees are taught as part of their Legal & Ethical Training that they should not discuss client information, events, knowledge of investigations, information about the client obtained from sources other than the client or results outside the work place. This information is considered confidential. Further, they are informed that failure to comply is a violation of their Data Integrity training and is considered grounds for termination of employment.
- 4.6 Undue Internal and External Pressures and Impartiality
  - 4.6.1 EETSE Atlanta, Inc. strives for the highest caliber of laboratory performance in conjunction with accomplishing quality objectives. One component of realizing this goal is to protect laboratory personnel from undue internal and external pressures.
  - 4.6.2 The laboratory shall be responsible for the impartiality of its laboratory activities and shall not allow commercial, financial or other pressures to compromise impartiality. If a risk to impartiality is identified, the laboratory shall be able to demonstrate how it eliminates or minimizes such a risk.
  - 4.6.3 At EETSE Atlanta, Inc. analysts and technicians are insulated from work-related undue pressures that would compromise the quality of their work. Management is aware and considerate of these internal pressures such as management burdens and project deadlines, and of external stresses such as customer complaints and priority requests for analysis.
  - 4.6.3 Management policy is to remain supportive of laboratory personnel and aware of their workloads and the demands placed upon them. Precautions are taken to ensure that there are no conflicts of interest



between staff and clients. For example, priority requests, complaints, or status of work inquiries are directed through supervisors, managers, or administrative personnel.

- 4.6.4 Internal complaints and concerns expressed by employees are handled by EETSE Atlanta' policy of encouraging free communication with all levels of management. An "open door" approach promotes avenues of communication that could prevent improper conduct or data integrity issues resulting from undue external and internal pressures. Reducing workload for individual employees may include assigning additional personnel to assist in heavily backlogged areas, providing supplies, or equipment, or affording technical assistance and resources.

#### 4.7 Responsibility for QA Program Adherence

- 4.7.1 It is the responsibility of all EETSE Atlanta employees to implement the Quality Assurance Program effectively. All chemists and technicians are responsible for understanding and following the measures of the QA program, and for reporting any quality failures to a Manager or Supervisor in a timely manner.

- 4.7.2 Supervisors and Managers are responsible for ensuring that all laboratory personnel are familiar with the requirements of the Quality Assurance Program and that these requirements are implemented and maintained. It is the responsibility of each Supervisor to ensure that any quality failures are reported to the Project Manager and the Quality Assurance Department immediately.

- 4.7.3 It is the responsibility of the Technical Director to ensure that all laboratory personnel are trained to perform their assigned analyses.

- 4.7.4 The laboratory's approved signatories (designees of the Technical Manager) are identified as follows:  
Laboratory Manager  
Director of Project Management  
Project Managers

Individuals are authorized as project manager report signatories based on meeting the qualifications of project manager job description in the QA Manual as well as completion of the following training:

Quality Assurance Manual  
Data Integrity Training  
PCM Asbestos Reports Training

Individuals are authorized to act as project manager report signatories when these documents have been completed and signed by the individual(s) and referenced managers.

### 5.0 QUALITY ASSURANCE PROGRAM

- 5.1 The Quality Assurance Program (QAP) has been developed to provide a high-quality document that complies with the intent of testing regulations, standards, and established guidelines. The QAP takes into account requirements for special controls, processes, test equipment and skills to attain the required quality and the need for verification of quality by inspection and test. It also provides for the training of personnel to attain required proficiency levels and for regular assessments of the QAP to assure the adequacy of resources and the effectiveness of management controls established to achieve quality. The Quality Manual is maintained in a current condition.
- 5.2 Revisions to this QAP are made and controlled by the QA Manager, Technical Director, and Business Unit Manager in accordance with EETSE Atlanta' quality assurance practices. Such revisions and updates shall be performed as needed to improve the effectiveness of this program. Control of this QA manual is accomplished following the requirements of Section 8.2, "Document Control".

## 5.3 Definitions (Not Alphabetical)

5.3.1 Batch - A group of samples and QC samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents.

5.3.1.1 Preparation Batch - is composed of between 1 and 20 samples of the same matrix and meets the criteria for a batch as described in Section 5.3.1. Preparation batches consist of extractions, digestions, or concentrations. The maximum time between the start of processing of the first and last sample in a preparation batch is 24 hours. A preparation batch must have a spiked sample and a duplicate sample (or matrix spike duplicate).

5.3.1.2 Analytical Batch - is composed of prepared environmental samples (extracts, digestates, or concentrates) or non-prepared environmental samples which are analyzed together as a group. When the batch contains non-prepared samples as a group, the rules for preparation batches must be followed.

5.3.1.2.1 Test categories where samples do not have to be prepared prior to analysis include GRO, VOC, Ion Chromatography, direct injection SVOC, orthophosphorus, turbidity, pH, and Conductivity.

5.3.1.2.2 When soil VOC or GRO samples arrive in ENCORES or in jars, they considered prepared when placed into water or methanol. Rules for preparation batches apply.

5.3.1.2.3 The maximum length of time that an analytical batch can be left open is 24 hours. An analytical batch may have no more than 20 samples of similar matrix.

5.3.1.2.4 Test procedures take precedence over analytical batch considerations. For example, if the test procedure identifies a batch as occurring over a 12 or 24 hour period, then batches may not be left open for the time period stated in Section 5.3.1.2.1.

5.3.1.2.5 Methanol or water VOC or GRO samples prepared in the laboratory from ENCORES or jars cannot be combined into a sequence with samples that have not been prepared by the laboratory so as to create a batch that contains more than 20 samples or runs for longer than 24-hours.

5.3.1.2.6 An analytical batch must include the analysis of a spiked sample and a duplicate sample (or matrix spiked duplicate) every 20 samples in the batch. In addition, internal quality control dictates that a LCS sample is also included in the batch.

5.3.1.2.7 Always analyze the quality control samples at the beginning of the analytical batch. Quality control samples include the MS, MSD, LCS, LCSD, MB, CCB, and CCV.

5.3.1.2.8 Always verify batch completion date in LIMS.

5.3.2 Accuracy - The nearness of a result or the mean (average) of a set of results as compared to the true value. Accuracy is assessed by means of reference samples, laboratory control sample (spikes), matrix spikes, etc, and is measured in percent recovery.

5.3.3 Blank - There are several types of blanks. The various types are defined below.

5.3.3.1 Calibration Blank - specified in some analytical procedures, is an aliquot of analyte free matrix used to establish a zero-concentration instrument response value.

5.3.3.2 Reagent Blank (as defined under AIHA LAP Accreditation) - includes all the reagents using the same procedure as is used for samples.



- 5.3.3.3 Method Blank, referred to as a media blank (defined under AIHA LAP Accreditation) - Blank sampling media and analytical reagents analyzed, when applicable, with each batch of samples, using the same procedure that is used for samples. Typical media includes wipes, filters, and air cartridges. Clients should supply specimens of blank sampling media from the same source lot as was used for collecting the field samples.
- 5.3.3.4 Method Blank (as defined for environmental samples under NELAC or other state accreditations) - an aliquot of analyte-free matrix, usually reagent water or clean sand, to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank is carried through the complete sample preparation and analytical procedure. The method blank is used to document the absence of contamination resulting from the analytical process.
- 5.3.3.4.1 Except for certain conditions listed below, all analytes associated with the blank must have concentrations less than the reporting limit.
- 5.3.3.4.1.1 The reporting limit may be raised above the level of contamination in the method blank and associated samples with documentation of client approval. (Note: This is not acceptable under any AIHA LAP Accreditation Programs.)
- 5.3.3.4.1.2 Sample results are 10 times the concentration of the method blank. The data may be reported with a flag indicating that low level contamination was detected in the method blank. Report data with a "B" qualifier.
- 5.3.3.4.2 Field Blank (Usually associated with environmental samples under NELAC or other state accreditations) - also called an equipment blank. A field blank is an aliquot of analyte-free water brought to the field in sealed containers, transferred to a sample container, and transported back to the laboratory with the samples to be analyzed. The field blank is used to evaluate any possible contamination introduced to the samples during the field collection process.
- 5.3.3.4.3 Trip Blank - an aliquot of analyte-free water which accompanies the empty containers to the field and the collected samples back to the laboratory. The trip blank is an indicator of possible sample contamination originating from site conditions and sample transportation.
- 5.3.4 Initial Calibration Verification (ICV) Standard - An ICV is a standard that has been prepared from a source that is not the same as the source used for the preparation of the calibration curve. A second source represents either, a different lot number of standard purchased from the same vendor, or the same standard purchased from a second vendor. ICV standards are not prepared using the same procedures as samples (e.g., digestions or extractions). The individual test methods describe the preparative procedures and suppliers for these standards. ICV standards are analyzed immediately after a successful calibration curve has been developed. Typically, the ICV standards are prepared so that their concentrations represent a midpoint of the calibration curve.
- 5.3.5 Continuing Calibration Verification (CCV) Standard - A CCV is a standard that has been prepared from the same source as the calibration standards. CCV standards are not prepared using the same procedures as samples are prepared (e.g. digestions/extractions). Individual test methods describe the preparative procedures and suppliers for these standards. CCV standards must be analyzed every 10 samples throughout the analytical batch, and at the beginning and end of the analytical batch.

- 5.3.6 Laboratory Control Sample (LCS) - Typically prepared by spiking an analyte free matrix such as an aliquot of reagent water or analyte-free soil (Work done under AIHA LAP IHLAP accreditation, the LCS/LCSD is prepared by spiking the same media used for sampling. For AIHA LAP ELLAP accreditation, the appropriate blank matrix/media is spiked) with the analyte(s) of interest. The LCS is prepared and analyzed employing the same methodology as the associated samples. The LCS is used to monitor, assess, and control the laboratory's performance of the methods employed for sample preparation and analysis. The LCS must be performed once per analytical batch, extraction batch, or digestion batch. An extraction or digestion batch is defined as twenty or fewer samples of similar matrix analyzed in a 24-hour period using similar preparative and/or extraction techniques. In many cases, a duplicate LCS sample (LCSD) will be analyzed along with the LCS.
- 5.3.7 Deionized Water (DI Water, DIW) - Reagent free water that is prepared by passage through various filters and membranes.
- 5.3.8 Environmental Sample - An environmental sample or field sample is a representative portion of any matrix (aqueous, non-aqueous, mixed waste, etc.) collected from any source for which the determination of the composition of the contamination is requested or required. For the purpose of this procedure, environmental samples are classified as follows:
- 5.3.8.1 Aqueous - Aqueous samples include surface water, ground water, drinking water, or wastewater. Wastewater consists of municipal and industrial influents and effluents.
  - 5.3.8.2 Soils - Soil samples consist of sediments, soils, and sludges.
  - 5.3.8.3 Non-Aqueous Liquids - Non-aqueous liquids consist of solvents, oils, and fuels. These sample types are not miscible with aqueous samples.
  - 5.3.8.4 Non-Soil Solids - Non-soil solids consist of solid waste, precipitate waste, industrial sludges, concrete, wood, paint chips, ash, and wipes.
  - 5.3.8.5 Bioassay - Bioassay samples consist of bio-solids and municipal waste treatment sludges.
  - 5.3.8.6 Air - Air samples consist of filters, absorbent traps, activated carbon, and passive monitors used in the collection of air samples. Additionally, air samples can be collected in SUMMA canisters or Tedlar bags. In these two cases, the sample is the air itself.
- 5.3.9 External Quality Control - Practices that monitor the data quality from sources outside the control of the laboratory (e.g. multi-laboratory performance evaluation samples & external audits).
- 5.3.10 Instrument Detection Limits (IDL) - Minimum concentration limits of an analyte above the instrument noise level that can be detected & quantified with a high degree of confidence (>95%).
- 5.3.11 Internal Quality Control - Those practices implemented internally to monitor the quality of data and which are under the control of the laboratory (i.e. intra-laboratory performance samples, internal audits, single blind samples, etc.)
- 5.3.12 Matrix Spike / Matrix Spike Duplicate (MS/MSD) - An environmental sample to which predetermined quantities of specific analytes are added prior to sample preparation and analysis. Percent recoveries are calculated for each of the spiked analytes to assess the effect of the matrix on analyte recovery. In addition, a calculation of precision is made between the results of the MS/MSD to determine reproducibility of results in a specific matrix. This is measured by either the Relative Percent Difference (RPD) or Percent Relative Standard Deviation (%RSD). MS and MSD samples

are analyzed with each analytical, extraction, or digestion batch of up to 20 samples. MS and MSD precision and accuracy limits are developed from quality control data.

5.3.13 Method Detection Limits (MDL) - The term MDL is defined by the EPA as the minimum concentration of a substance that can be measured and reported, in a specific matrix, with 99% confidence that the measured concentration is distinguishable from method blank results (Note: previous definition was that the measured concentration was greater than zero). Initial MDLs are calculated two ways. First, they are calculated any analyte presence in method blanks as MDL<sub>b</sub> (Blank MDL). If some but not all of the method blanks for an individual analyte give numerical results, the Blank MDL is set equal to the highest result. Second, the MDL is calculated from spiked samples, giving the MDL<sub>s</sub> (Spike MDL). The MDL used will be the higher MDL between the Blank MDL and the Spiked MDL. MDLs are verified quarterly by analyzing two spiked samples. Annual reverification using data from the four quarterly MDL verifications or from using the last 50 or six months' worth of blanks, whichever is greater. The annual reverification is performed within 13 months of the initial MDL. The calculated MDL using the quarterly checks must be within a factor of 0.5 to 2.0 of the initial MDL. If it is, the reverification is complete and the MDL value remains the same until the next reverification. If the calculated MDL is not within a factor of 0.5 to 2.0 of the (initial) MDL study, the initial study must be repeated.

5.3.14 Precision - The agreement of a set of replicate results. Typically, the laboratory analyzes LCS and LCSD or MS and MSD samples and reports the results as RPD or %RSD.

5.3.15 Practical Quantitation Limit (PQL) - is a term that is not used today by regulators. Historically, the PQL is viewed as five times the Method Detection Limit (MDL). Frequently, it is a general term meaning reporting limit.

5.3.16 Qualifiers - A phrase or word group that limits or modifies the meaning. (See section 12.5.4)

5.3.17 RCRA - Resource Conservation Recovery Act

5.3.18 Relative Percent Difference (RPD) - A measure of agreement between two replicate results, expressed as follows:

$$RPD = 100 * \frac{X_1 - X_2}{\bar{X}}$$

where:  $X_1$  and  $X_2$  = the two results

$\bar{X}$  = mean value of the results

5.3.19 Relative Standard Deviation (RSD) - The variance from the mean or true value divided by the mean or true value, expressed as a percentage.

$$\% RSD = 100 * S / \bar{X}$$

where:

$\bar{X}$  = arithmetic mean of the measurements

S = variance

5.3.20 Representativeness - The degree to which data represent a characteristic of a population or set of samples. It is a measurement of both analytical and field sampling precision.

5.3.21 Standard Curve - A curve, which plots known standard concentrations or amounts of an analyte versus the instrument response for the analyte. This curve is used to determine the concentration of the analyte in the unknown samples.

- 5.3.22 Surrogate - Organic compound(s) which is/are similar to analytes of interest in chemical composition, extraction efficiency, and chromatographic retention, but are not normally found in environmental samples. These compounds are spiked into all blanks, standards, samples, and spiked samples prior to analysis. Percent recoveries are calculated for each surrogate to assess the effectiveness of the sample preparation and analysis and any potential matrix effects.
- 5.3.23 TNI - The NELAC Institute
- 5.3.24 AIHA LAP - American Industrial Hygiene Association, Laboratory Accreditation Program
- 5.3.25 Method of Standard Additions - The standard addition technique involves adding known amounts of standard to one or more aliquots of the processed sample solution. This technique compensates for a sample constituent that enhances or depresses the analyte signal, thus producing a different slope from that of the calibration standards. It will not correct for additive interferences that cause a baseline shift.
- 5.3.26 Estimation of Uncertainty - is the parameter associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurement. (See section 12.1 for more information.)
- 5.3.27 Measurand Quantity intended to be measured or analyte concentration. The measurands for methods under AIHA LAP accreditation are available in the SOPs. (Sec 12.1 for more info.)
- 5.3.28 Interim Limits - are used to establish the level of uncertainty when limits are not available until enough laboratory data has been compiled to establish historical limits. Interim limits may be derived from published methods, those limits within similar analysis, LCS recovery ranges, or based on reasonable expectations from laboratory experience.
- 5.3.29 Lower Limit Of Quantitation (LLOQ) - As defined in EPA's SW-846 Compendium, it is the lowest point of quantitation, or in most cases, the lowest point in the calibration curve, which is ideally less than or equal to the desired regulatory action levels based on the stated project requirements.
- 5.3.30 Minimum Level - is a term from 40CFR136 that refers to either the sample concentration equivalent to the lowest calibration point in a method or a multiple of the MDL, whichever is higher. Minimum Levels may be obtained in several ways: they may be published in a method; they may be based on the lowest acceptable calibration point used; or they may be calculated by multiplying the MDL (from the method or as determined by the laboratory) by a factor of 3.
- 5.3.31 BRL (Below Reporting Limit) - The acronym BRL is used to report the PQL in an easy to understand manner. On EETSE Atlanta analytical reports, BRL is next to the Reporting Limit. Together, BRL and the Reporting Limit mean that if the analyte were present in the sample, it would be below the reporting limit. It would be below the range of specified limits of precision and accuracy. In most cases, this corresponds to the lowest point on the calibration curve. The relationship between the MDL and the PQL (Reporting Limit) is that the MDL is the point at which the analyte is detected but the PQL is the point at which the quantitation is considered to be of known precision and accuracy. Concentrations between the MDL and PQL are estimated values.
- 5.3.32 Risk - That which makes achieving an objective uncertain (or the effect of uncertainty in objectives)
- 5.3.33 Risk Assessment - Comparison of the risk likelihood and impact to the severity of the risk's impact.
- 5.3.34 Risk Management - is the identification, assessment and prioritization of risks followed by analysis to minimize, monitor, and control the impact to maximize the realization of opportunities.
- 5.3.35 Opportunities - Events with potential positive outcomes for the organization or company.

## 5.4 Data Quality Objectives for Environmental Testing

- 5.4.1 Precision. The laboratory objective for precision is to meet the performance criteria demonstrated for all analytical methods as published by the USEPA under SW-846 and 40 CFR Part 136. These criteria are met on similar samples and similar sample matrices. Precision is documented based on replicate analysis, usually duplicate or matrix spike duplicate samples.
- 5.4.2 Accuracy. The laboratory objective for accuracy is to meet the performance criteria demonstrated for these analytical methods as published by the USEPA under SW-846 and 40 CFR Part 136. These criteria are met on similar samples and similar sample matrices. Accuracy is documented based on recovery data; usually matrix spike samples.
- 5.4.3 Representativeness. The laboratory objective for representativeness is to provide data which is representative of the sampled medium. The representativeness of the analytical data is a function of the procedures used in processing the samples.
- 5.4.4 Comparability. The comparability objective is to provide analytical data for which the accuracy, precision, representativeness, and reporting limit statistics are similar in quality to data generated by other laboratories for similar samples and to data compiled by EETSE Atlanta over time. The comparability objective may be documented by any of the following:
  - 5.4.4.1 Inter-laboratory studies carried out by regulatory agencies.
  - 5.4.4.2 Inter-laboratory studies initiated for specific projects or contracts.
  - 5.4.4.3 Comparison of periodically generated statements of accuracy, precision, and reporting limits to those of other laboratories.
  - 5.4.4.4 Through approval from the US EPA or other regulatory agencies for any procedure to which significant modifications have been made.
- 5.4.5 Completeness. The completeness objective for data can be set for a particular project and is expressed as the ratio of the valid data to the total data over the course of the project. The comparison between the amount of valid, or usable, data you originally planned to collect, versus how much you collected. [Appendix XI Footnote 37](#) (from EPA, it is usually described as a measure of the amount of available data from a statistical system compared to the amount that was expected to be obtained.)

## 5.5 Criteria for Quality Indicators

- 5.5.1 The precision and accuracy acceptability limits for analyses performed at EETSE Atlanta are located in the LIMS and posted on the portal server. The limits in the tables are either laboratory-generated or derived from USEPA methods.
- 5.5.2 [Table 5-3](#) defines the criteria for data acceptability. Data may be accepted when QC falls outside these limits if probable cause can be attributed to the matrix, and laboratory control samples (LCS) show that the method is in control. Deviations are documented in the final report to the client. In instances where an LCS limit is not available, a limit of [30-170%](#) recovery may be used until in-house limits are available. (Note: Sometimes an alternative default limit may be found in a published method and substituted.) In some cases, lower default limits may be set with approval from the Quality Assurance Manager and Technical Director. The acceptable range of some compounds may be broader, based on prior knowledge of the analyte (e.g., phenols in EPA Method 8270C).



## 5.5.3 Statistically Derived Limits

- 5.5.3.1 Selected methods and programs require statistically derived accuracy and precision limits. EETSE Atlanta routinely uses statistically derived limits to evaluate method performance and to determine when corrective action is appropriate.
- 5.5.3.2 The laboratory periodically updates the limits as stated, but no less than annually. Analysts must use the current limits as found in LIMS.
- 5.5.3.3 The QA Manager maintains an archive of all limits used within the laboratory. If a method defines the QC limits, the method limits are used. If a method requires the generation of historical limits, they can be derived from data in the LIMS database or by viewing archives.

## 5.5.4 Development of new QC limits.

- 5.5.4.1 The QA Manager determines limits using the in-house LIMS system. This is accomplished by the statistical analysis of data for each test method where the method specifies that internal limits are developed.
- 5.5.4.2 Reviewed data types within the methods include LCS, LCSD, MS, MSD, and surrogates in samples, control samples, and spikes. It is recommended that surrogates are evaluated on a separate basis for samples, LCS, and MS since recovery limits will be wider for client samples than for laboratory control samples.
- 5.5.4.3 QC limits are updated in LIMS through the Quality Control Section. To change limits, activate the tab called "control charting". Enter the desired test code, analyte, and sample type. Enter the number of desired data points, and then "get data".
- 5.5.4.4 Ideally, 20 or more data points chosen. For tests which data is generated more frequently, e.g. volatile surrogate recoveries in samples, usually, 40 data points or more are used.
  - 5.5.4.4.1 For tests in which there are less than 20 data points, interim limits specified by the method are used unless approved by the QA Manager. If interim limits are not specified by the method, the QA Manager and Technical Director must choose interim limits that represent an estimation of the current laboratory performance. The data in the tables should be footnoted accordingly.
  - 5.5.4.4.2 For tests in which data is generated more frequently, e.g. volatile surrogate recoveries in samples, usually, 40 data points or more are used. The LIMS will pick data points in historical order beginning with the date the action is being performed. The LIMS will compile as many data points are available if the requested number exceeds the number of points in LIMS The LIMS will pick data points in historical order beginning with the date the action is being performed. If the requested number exceeds the number of points in LIMS, then LIMS will compile as many data points as are available.
- 5.5.4.5 Data should be observed for outliers, and these samples de-selected using the "radio buttons". Once the data is reviewed, limits can be recalculated by choosing the "Re Calc Stats" tab. Outlying data points are determined by the following two methods:
  - 5.5.4.5.1 Grubbs Test - is a statistical test used to detect outliers in a univariate data set assumed to come from a normally distributed population.
  - 5.5.4.5.2 Manual observation of data set to verify that the data points selected are within the calculated control limits. If they are not, the data points must be "de-selected" and the limits recalculated until the data is within the calculated limits.

5.5.4.6 The lower limit determined from historical data shall not be set to a value less than 10. That is, if the calculated lower limit is  $< 10$ , a default value of 10 will be used for the lower limit unless specified by the published method.

5.5.4.7 When the data set is acceptable, choose the “Preview” tab to view data in a page format.

5.5.4.8 Through the “Windows” application, print the data in “Adobe” format by selection of the proper network printer. The file should be saved in one of the following folders depending on which QC type:

TestMethod\_Matrix\_LCS\_LCSD\_REC  
 TestMethod\_Matrix\_LCS\_LCSD\_RPD  
 TestMethod\_Matrix\_MSD\_REC  
 TestMethod\_Matrix\_MSD\_RPD  
 TestMethod\_Matrix\_SURR\_REC

### 5.5.5 Review of revised QC limits

5.5.5.1 After data has been revised for each test method and matrix, results are discussed with the appropriate department managers and Technical Director, if there are concerns about the new limits. The updated limits are then entered into the laboratory LIMS system.

5.5.5.2 New limits are calculated or reviewed every one to two years by the QA Manager with updates as necessary.

### 5.6 External Quality Assurance Objectives

5.6.1 External Quality Control is the process of employing outside sources to monitor the quality of the data produced by the laboratory. Included in the external quality control program are the analysis of performance evaluation samples and participation in performance evaluation audits.

5.6.1.1 EETSE Atlanta, Inc. analyzes Proficiency Test (PT) samples for each PT field of testing as defined in The NELAC Institute (TNI) and AIHA LAP Fields of Test tables according to matrix type, analyte, and regulatory or environmental program. Samples are obtained from NELAP-designated PTOB / PTPA-approved PT providers (such as Environmental Resource Associates) for NELAP compliance or directly from AIHA LAP to meet their program requirements. The results of the analyses are submitted to the PT Provider for scoring. Study reports are maintained for a minimum of five years on the portal server. The analyses of PT studies are conducted in accordance with all TNI or AIHA LAP. Where required (as with gravimetric analyses for AIHA LAP), an internal PT will be used.

5.6.1.1.1 EETSE Atlanta participates in a minimum of two single-blind, single-concentration PT studies per year for each PT field of testing for which it is accredited. Studies are performed at least 15 calendar days apart. Successful completion of two of the last three proficiency rounds for a given PT field of testing must occur in order to maintain accreditation.

5.6.1.1.2 Blind water or soil PT samples contain amounts of specific constituents that are unknown to laboratory personnel. Upon arrival, PT samples are logged into the Laboratory Information Management System (LIMS) and tracked as routine environmental samples. PT samples provided by the vendor may be ‘whole’ samples or may have been provided in a concentrated form. PT vendor instructions are followed and dilutions performed on the concentrated vials to make them the ‘whole’ sample to be tested. Routine procedures for dilutions and analysis are followed per method specific SOPs. The laboratory results must be completed and reported within the required turnaround time.



- 5.6.1.1.3 EETSE Atlanta, Inc. maintains copies of all written, printed, and electronic records, including, but not limited to bench sheets, instrument chromatograms or printouts, data calculations, and data reports resulting from the analysis of any PT sample. These records are maintained for five years or for as long as required by the applicable regulatory program, whichever is greater. These records include a copy of the PT study report forms used to report PT results. All laboratory records are available to assessors of the Primary Accrediting Authority during on-site audits.
- 5.6.1.1.4 Whenever a study is failed, EETSE Atlanta determines the cause for the failure and takes the necessary corrective actions. The investigation and action taken are documented into QA records and provided, if required, to the Primary Accrediting Authority.
- 5.6.1.2 Performance evaluation samples are also obtained from the following list of suppliers.
- 5.6.1.2.1 ELPAT. This proficiency testing program is administered by the American Industrial Hygiene Association-Laboratory Accreditation Program (AIHA LAP). Once a quarter, the laboratory receives a set of proficiency samples from Research Triangle Institute for the analysis of lead content. The matrices are soils, wipes, and/or paint chips.
- 5.6.1.2.2 PAT. This proficiency testing program is administered by the American Industrial Hygiene Association-Laboratory Accreditation Program (AIHA LAP). Once a quarter, the laboratory receives a set of proficiency samples to be analyzed for metals, asbestos fibers, This program is required as part of the laboratory's certification to perform analyses on samples that measure indoor air quality.
- 5.6.1.2.3 EMPAT. This proficiency testing program is administered by the American Industrial Hygiene Association-Laboratory Accreditation Program (AIHA LAP). EMPAT fungal proficiency samples are available for both the 'Direct Examination'. Once a quarter, the laboratory receives notification that the Fungal Direct Examination Proficiency Testing Program has opened on the AIHA LAP website. The lab has access to the portal for 24 hours a day for 7 days at which time the study closes. This program requires the identification of selected slides within a set amount of time.
- 5.6.1.2.4 North Carolina Department of Environmental, Health and Natural Resources. Once a year the laboratory receives performance samples for certification by North Carolina for all analyses not already submitted under other programs. These samples are critical for the continuation of certification by the state of North Carolina. To renew certification each year, the lab must submit acceptable PT sample results to the NC WW/GW LC Program for each parameter, analyte, technology and matrix (where a method is matrix-specific) by October 31. A laboratory that fails a PT sample for a parameter method technology must take steps to identify the root cause of the failure, take corrective action, report the corrective action taken to NCDENR, and participate in a second PT study meeting the criteria listed previously in this policy. The corrective action response must include the laboratory's root cause analysis and a copy of any objective evidence (e.g., calibration curves, revised procedures, records, training records, standard operating procedures, etc.) to indicate that the corrective actions have been implemented /completed. The results of the remedial PT must be received in this office within 60 days from the date the failed results are issued by the accredited proficiency testing provider. A laboratory failing the second (or remedial) PT study may be decertified for that parameter method technology (not necessarily for all technologies for that parameter).

For multi-analyte parameters (e.g., organic analyses), when greater than 80% of analytes are acceptable, but one or more individual analytes are graded unacceptable, acceptable performance has been demonstrated for the parameter method technology. The laboratory must, however, analyze a remedial PT for the individual analytes that were graded unacceptable. When a remedial PT is graded unacceptable for an individual analyte (constituting a second unacceptable result), the laboratory must qualify data for those individual analytes as “estimated” (whether detected or not) until acceptable results are obtained on two consecutive remedial PTs for the analyte in question.

### 5.6.1.3 Performance Audits

5.6.1.3.1 In order to maintain certification in many states, to comply with commercial contracts, and to satisfy many agency requirements, EETSE Atlanta, Inc. must undergo initial and ongoing audits performed by external auditors. These audits may take the form of technical and/or evidentiary audits. Every section of the laboratory, both analytical and clerical, should be ready at all times to participate in these audits.

5.6.1.3.2 In the event that adverse findings or deficiencies are discovered, or observations and/or recommendations are made during an audit, QA and laboratory management shall review the comments and submit a response, including corrective actions, to the audit report.

### 5.6.1.4 State Audits

5.6.1.4.1 State Audits are performed in accordance with each individual state’s certification program. These audits are generally performed to determine the laboratory’s suitability to perform environmental analyses according to the parameters dictated by that state.

### 5.6.1.5 Commercial Audits

5.6.1.5.1 Audits performed by commercial clients may be scheduled on a pre-award basis for a contract. Once the contract is awarded, audits may be scheduled at the request of the client or at a pre-determined frequency. The client, as well as professional audit teams, may perform audits required by commercial clients.

## 5.7 Internal Quality Control

5.7.1 The internal quality control program serves two primary functions. One function is to monitor the reliability of the data (e.g., accuracy and precision). The other function is to control and maintain the quality of the data (e.g., the use of ACS grade reagents, traceable standards, etc.).

5.7.2 The following sections outline the specific actions and procedures employed to monitor the process for producing and reporting quality data that is consistent with the Quality Control Program. Processes such as, but not limited to, **validity of results**, verification of operator competence, recovery of known spikes, analysis of reagent blanks, calibration with traceable standards, analysis of duplicates, and maintenance of quality control charts must be employed and continually monitored. The laboratory may also adopt additional quality assurance procedures; however, the minimum requirements are discussed below. The QA Manager and Technical Director, under restrictions by the methodology and in conjunction with the appropriate laboratory management staff, shall determine which requirements shall be implemented for each section.

5.7.3 Training & Certification of Operator Competence. Quality Control begins with the establishment of basic laboratory techniques and skills. It is imperative that analysts receive proper training before performing independent laboratory analyses. Each analyst must demonstrate proficiency of laboratory techniques and skills. Records to that effect are kept in the employee’s personal training files.

- 5.7.4 Documentation. Regardless of which analytical procedures are used in the laboratory, the methodologies employed shall be carefully documented.
- 5.7.4.1 Standard Operating Procedures (SOPs) and approved methods may be periodically modified, updated, or replaced in their entirety due to advances in technology, regulatory protocols, or at the discretion of laboratory management. All proposed changes, however, are reviewed by the Technical Director to ensure compliance with all regulatory protocols.
- 5.7.4.2 If a client requests a change of procedure, the change must be pre-approved by the laboratory prior to use. The change must be documented in writing and kept on file as part of the laboratory project records.
- 5.7.4.3 If a method is modified such that it no longer complies with the provisions set forth by the accrediting agencies, the client will be informed.
- 5.7.4.4 Documentation of analytical procedures for generating laboratory data shall be clear, concise, adequately referenced, and reflect the actual steps employed by the analyst.
- 5.7.5 Standard Operating Procedures (SOP). Methodologies employed in the laboratory are documented in SOPs. (Table 5-3 shows a Summary of Calibration and QC Procedures for Various Tests.) See Chapter 8 gives detailed information on SOPs.

- 5.7.6 Initial Calibration Verification (ICV) Standard. Individual component recovery of the ICV standard is calculated using the following equation:

$$\text{ICV Standard Percent Recovery} = \frac{A}{T} \times 100$$

where:

A = concentration measured

T = true value of the spiking concentration

- 5.7.6.1 The ICV must be made from a different source than the calibration curve standards.
- 5.7.6.2 The acceptable recovery limits for the ICV standards vary based on the individual procedure and are specified in Table 5-3.
- 5.7.6.3 If the recoveries of any of the ICV standards are not within the limits specified in Table 5-3, the test method may not be performed. The analyst must follow the out-of-control procedures discussed in Section 5.8 before initiating any analyses.
- 5.7.7 Continuing Calibration Verification (CCV) Standard. Individual component recovery of the CCV standard is calculated using the following equation:

$$\text{CCV Standard Percent Recovery} = \frac{A}{T} \times 100$$

where:

A = concentration measured

T = true value of the spiking concentration

- 5.7.7.1 The acceptable recovery limits for the CCV standards are procedure dependent and are specified in Table 5-3.

5.7.7.2 If the recoveries of any of the CCV standards are not within the limits specified in Table 5-3, the testing must be discontinued. The analyst must follow the out-of-control procedures discussed in Section 5.8 before continuing any analyses.

### 5.7.8 The Laboratory Control Sample (LCS)

5.7.8.1 The individual test methods describe the preparative procedures and suppliers for the LCS & LCSD standards. The LCS & LCSD samples are prepared in either reagent grade water or sand in accordance with the procedural steps followed for the preparation of a matrix spike sample.

5.7.8.2 Individual component recovery of the LCS(D) is calculated using the following equation:

$$\text{LCS (LCSD) Spike Percent Recovery} = \frac{A}{T} \times 100$$

where:

A = concentration measured

T = true value of the spiking concentration

5.7.8.3 Precision between the LCS and LCSD recoveries is calculated using the following equation:

$$\% \text{ RPD} = \frac{\text{Difference between LCS and LCSD recoveries}}{\text{Average of LCS and LCSD recoveries}} \times 100$$

5.7.8.4 The acceptable recovery limits for the LCS standards vary based upon the individual procedure and are specified in LIMS test codes.

5.7.8.5 If recoveries of any of the LCS standards are not within the limits specified in the table, the testing must be stopped. If the precision between the two recoveries is not within the limits specified in the table, the testing must be stopped. The analyst must follow the out-of-control procedures discussed in Section 5.8 prior to continuing any analyses.

5.7.9 Matrix spike (MS) and matrix spike duplicate (MSD). Individual component recovery of the matrix spike is calculated using the following equation:

$$\text{Matrix Spike Percent Recovery} = \frac{(A - B)}{T} \times 100$$

where:

A = concentration measured after spiking

B = background concentration

T = true value of the spiking concentration

5.7.9.1 MS and MSD sample recovery limits are used to determine matrix effects on the recovery target analytes. The acceptable recovery limits for the MS and MSD standards are indicated in [LIMS test codes](#).

5.7.9.2 It is the discretion of the department manager to have a batch re-processed or re-analyzed after assessment of the matrix spike recovery values and other batch QC data. The analyst must follow the out-of-control procedures discussed in Section 5.8 prior to continuing any analyses.

5.7.9.3 In the event that insufficient sample is provided for MS/ MSD analysis, the narrative of the final report must be amended to indicate lack of sample for analysis of MS and / or MSD.

5.7.10 An Initial Demonstration of Capability (IDOC) study is performed to establish the ability of an analyst and/or analytical system to generate acceptable precision and accuracy data. An IDOC study is performed on each certified method and matrix analyzed in the laboratory where applicable. Samples prepared for the IDOC studies are made from a second source independent of the standard source used for the calibration determination. A second source standard may be a standard purchased from the same manufacturer but a different lot or batch. Four LCS's are prepared and analyzed. To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations:

- 5.7.10.1 Because of the nature of several test methods, IDOCs cannot be performed. These tests represent methods where samples of known concentrations cannot be prepared in the laboratory. Specific requirements for these test methods are described in Table 5-1\*\*\*.
- 5.7.10.2 Calculate the average recovery (x) in µg/L, and the standard deviation of the recovery(s) in µg/L, for each analyte using the four results. Demonstration of Capability must be updated and documented annually or more frequently if required by method with a Continuing Demonstration of Capability (CDOC). Other options for CDOC include the use of successfully passed third party Proficiency Test (PT) studies and Method Detection Limit studies that meet recovery and reporting limit criteria. (See Table 5-1)
- 5.7.10.3 The Method Performance Section of the individual SOP provides laboratory recovery and precision data for the method. Similar results from spiked water should be expected. Results are considered comparable if the calculated standard deviation of the recovery does not exceed the single laboratory RSD or 10% (20% for some organic analytes), whichever is greater and the mean recovery lies within the interval indicated by the test method, or  $X \pm 15\%$ , whichever is greater. Specific requirements for each NELAP certified test method as well as those required by AIHA LAP are described in Table 5-1\*\*\*.

Table 5-1 Demonstration of Capability Acceptance Criteria

| Certified Method                   | DOC Requirement                               | Control Limits/ Acceptance Criteria*                             |
|------------------------------------|-----------------------------------------------|------------------------------------------------------------------|
| AIHA LAP METHODS                   |                                               |                                                                  |
| SW3050B / N7082 (Lead Paint)       | IDOC: 4 sets of 5 Ref<br>CDOC: Batch QC or PT | 80-120%Rec<br>LCS Control Limits, MDLs or PT Acceptance Criteria |
| SW3050B / 7000B (Lead in Soil)     | IDOC: 4 sets of 5 Ref<br>CDOC: Batch QC or PT | 80-120%Rec<br>LCS Control Limits, MDLs or PT Acceptance Criteria |
| N7082 (Lead in Dust Wipe)          | IDOC: 4 sets of 5 Ref<br>CDOC: Batch QC or PT | 80-120%Rec<br>LCS Control Limits, MDLs or PT Acceptance Criteria |
| N7303 (Lead in Air)                | IDOC: 4 sets of 5 Ref<br>CDOC: Batch QC or PT | 80-120%Rec<br>LCS Control Limits, MDLs or PT Acceptance Criteria |
| N7400 (Asbestos PCM)               | PT Samples                                    | PT Acceptance Criteria                                           |
| Fungal Air Direct Exam (Micro)     | PT Samples                                    | PT Acceptance Criteria                                           |
| Fungal Bulk Direct Exam (Micro)    | PT Samples                                    | PT Acceptance Criteria                                           |
| Fungal Surface Direct Exam (Micro) | PT Samples                                    | PT Acceptance Criteria                                           |
| SM2120B Color                      | 4 LCS or PT                                   | LCS Control Limits or PT acceptance Criteria                     |
| SM2120F Color ADMI                 | 4 LCS or PT                                   | LCS Control Limits, MDLs or PT acceptance Criteria               |
| E100.2                             | Prep, LCS or PT                               | Meet Grid QC, Calib of TEM, EDXA, Camera                         |
| E120.1 Conductivity                | 4 LCS or PT                                   | LCS Control Limits or PT acceptance Criteria                     |
| SM4500H <sup>+</sup> B-2011 pH     | 4 LCS or PT                                   | LCS Control Limits or PT acceptance Criteria                     |
| SM2540C TDS                        | 4 LCS or PT                                   | PT acceptance Criteria                                           |
| SM2540D TSS                        | 4 LCS or PT                                   | LCS Control Limits or PT acceptance Criteria                     |



| Certified Method                          | DOC Requirement        | Control Limits/ Acceptance Criteria*               |
|-------------------------------------------|------------------------|----------------------------------------------------|
| SM2540B TS                                | 4 LCS or PT            | LCS Control Limits or PT acceptance Criteria       |
| E160.4 VS                                 | PT                     | PT acceptance Criteria                             |
| SM2540F Settleable Solids                 | PT                     | PT acceptance Criteria                             |
| E1664B Oil and Grease TPH                 | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E180.1 Turbidity                          | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E200.7 ICP EETSE Atlanta Metals           | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E200.8 ICP MS Metals                      | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E245.1 Mercury                            | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E300 Anions by IC                         | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM2310B Acidity                           | 4 LCS or PT            | LCS Control Limits or PT acceptance Criteria       |
| SM2320B Alkalinity                        | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM4500Cl G-2011 Residual Chlorine         | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM4500CN G-2016 Amenable Cyanide          | 4 LCS                  | LCS Control Limits                                 |
| SM4500CN E-2016 Total Cyanide             | 4 LCS or PT            | LCS Control Limits or PT acceptance Criteria       |
| E350.1 Ammonia (as N)                     | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| E351.2 TKN                                | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| E353.2 Nitrate (as N)                     | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| E353.2 Nitrate Nitrite (as N)             | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| NECi N07-0003 Nitrate-Nitrite (DA)        | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| E353.2 Nitrite (as N)                     | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM4500O H-2016 Dissolved Oxygen           | 4 LCS                  | LCS Control Limits                                 |
| E365.1 Ortho Phosphorus                   | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| E365.1 Total Phosphorus                   | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM4500S2 F-2011 Sulfide                   | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM4500SO3 B-2011 Sulfite                  | 4 LCS or PT            | RSD Limit $\leq$ RPD Limits                        |
| SM5210B BOD                               | 4 LCS or PT            | LCS Control Limits or PT acceptance Criteria       |
| E410.4 COD                                | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM5310B TOC                               | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| E420.1 Total Phenolics                    | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E420.4 Total Phenolics                    | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM5540C MBAS Surfactants                  | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E610 PAHs                                 | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E615 Herbicides                           | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E624.1 VOCs                               | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E625.1 SVOCs                              | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| FL-PRO                                    | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| PMOIST                                    | 4 LCS or PT            | Demonstration using Real World Samples             |
| RSK-175 Dissolved Methane, Ethane, Ethene | 4 LCS                  | MDLs or LCS Control Limits                         |
| SM10200H Chlorophyll                      | 4 LCS                  | LCS Control Limits                                 |
| SM2340B Hardness                          | 4 LCS or PT            | LCS Control Limits or PT acceptance Criteria       |
| SM3500Cr B Hexavalent Chromium            | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM3500Fe B Ferrous Iron                   | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |

| Certified Method                     | DOC Requirement                    | Control Limits/ Acceptance Criteria*               |
|--------------------------------------|------------------------------------|----------------------------------------------------|
| SM5210B CBOD                         | 4 LCS or PT                        | LCS Control Limits or PT acceptance Criteria       |
| SM9222B Total Coliforms              | PT                                 | PT acceptance Criteria                             |
| SM9222D Fecal Coliforms              | PT                                 | PT acceptance Criteria                             |
| SM9223B E.Coli / Total Coliforms     | PT                                 | PT acceptance Criteria                             |
| SW1010 Flash Point                   | 4 LCS or PT                        | LCS Control Limits or PT acceptance Criteria       |
| SW1030                               | DUP                                | Demonstration using Real World Samples             |
| SW1311 TCLP & 1312 SPLP              | SOP Signoff/EETSE Atlanta Training | N/A                                                |
| SW6010 ICP EETSE Atlanta Metals      | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW6020 ICP MS Metals                 | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW7196 Hexavalent Chromium           | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW7470 Mercury in Water              | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW7471 Mercury in Soils              | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW7473 Mercury in Soils              | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8011 EDB DBCP                      | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8015 DAI                           | 4 LCS                              | LCS Control Limits                                 |
| SW8015 DRO or GRO                    | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8081 Pesticides                    | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8082 PCBs                          | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8151 Herbicides                    | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8260 Oxygenates                    | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8260 VOCs                          | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8270 SVOCs                         | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8310 PAHs                          | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8315 Formaldehyde and Acetaldehyde | 4 LCS                              | MDLs or LCS Control Limits                         |
| SW9010 9014 Cyanide                  | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW9030 9034 Sulfide                  | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW9040 pH in Water                   | 4 LCS or PT                        | LCS Control Limits or PT acceptance Criteria       |
| SW9045 pH in Soil                    | 4 LCS or PT                        | LCS Control Limits or PT acceptance Criteria       |
| SW9050 Conductivity                  | 4 LCS or PT                        | LCS Control Limits or PT acceptance Criteria       |
| SW9056 Anions by IC                  | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW9060 TOC                           | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW9065 Total Phenolics               | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW9070 Oil and Grease TPH in Water   | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW9071 Oil and Grease TPH in Soils   | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW9095 Free Liquids by Paint Filter  | SOP Sign-Off Only                  | Demonstration using Real World Samples             |
| TO-14A, TO-15                        | 4 LCS                              | MDL or LCS Control Limits                          |

5.7.10.4 The large number of analytes in multi-element analyses presents a substantial probability that one or more will fail at least one of the acceptance criteria when all analytes of a given method are determined. Should this occur, re-analyze only the failed analytes, following the procedures discussed in this section.



5.7.10.5 When one or more of the analytes tested fails at least one of the acceptance criteria, the analyst must proceed according to the out-of-control procedures discussed in Section 5.8.

5.7.10.6 Due to the nature of several test methods, IDOCs cannot be performed. These tests represent methods where samples of known concentrations cannot be prepared in the laboratory. Tests that are included in this category are EPA 110.2, 160.3, 160.4, 160.5, 150.1, 9040, 9045, 1010, SM 2340B, SM2340G, SM9223, and SM9222. To complete IDOCs for these tests, the analyst(s) must satisfactorily pass available PE samples for all appropriate matrices.

5.7.10.7 Analyst Demonstration of Capability and training includes the following:

- Quality Assurance Manual Training (annually)
- Data Integrity (Legal & Ethical) Training (annually)
- SOP Training (initially and as updated)
- ICNs associated with the SOPs (initially and as updated)
- Demonstration of Capability (program specific)
- Procedure and Checklist Training (initially and as updated)

Individuals are authorized to perform analysis when these documents have been completed and signed by the individual(s) and referenced managers.

5.7.10.8 AIHA LAP Training Requirements

AIHA LAP Technician/Analyst Training Requirements. All technicians and analysts must complete training and demonstrate proficiency prior to analysis of any ELLAP or IHLAP program samples. The laboratory documents the competence requirements for each function influencing laboratory activities, including requirements for education, qualification, training, technical knowledge, skills and experience using the following:

- Resumes for the determination of education and previous experience
- Standard Operating Procedures (SOPs) and other training verified with sign-offs (QA Manual, Data Integrity, Health & Safety, general procedure training, etc.)
- Proficiency Testing results
- Routine Quality Control performance
- Frequency of Corrective Action Reports pertaining to analyst
- Observations from management
- Internal audit assessments

The training and proficiency demonstrations must meet the requirements specified in the AIHA LAP LQAP Policy Document, Modules 2A, 2B and 2C and are described in Section 1.2 and 1.3 below.

5.7.10.8.1 ELLAP Specific Technician/Analyst Training Requirements:

5.7.10.8.1.1 Initial demonstration of capability.

Each technician/analyst must complete at least 20 days work/training in the prep and / or metals analysis lab using technologies/instrumentation similar to that to be used for ELLAP samples under the direct supervision of an ELLAP trained tech / analyst prior to unsupervised prep / analysis of ELLAP regulated client samples.

Each analyst/technician must read, understand & agree to follow the laboratory SOP and document using the SOP Acknowledgement sign-off form. Each technician / analyst must prep and/or analyze as appropriate at least 2 blind reference material test samples. These samples may be AIHA LAP provided PT samples or laboratory prepared Certified Reference Material of the appropriate

## Environment Testing

matrix, i.e. soil, paint, wipe (spiked with bag house dust) or air filter. Results must fall within the PT acceptance range or laboratory LCS range as appropriate.

Each technician/analyst must complete a minimum of 4 independent test runs of sample preparation/analysis prior to prepping/analyzing actual samples. This test is performed through the digestion/analysis of four separate groups of 5 replicate, matrix specific Certified Reference Material samples, with each group separated by at least one day. To be deemed acceptable per ELLAP requirements, 75% of the replicates in each group must recover within 90-110% of the true value. Any individual group that fails to meet the ELLAP criteria must be repeated in its entirety (all 5 replicates repeated).

Once all requirements in 5.7.10.8.1.1 have been met, the technician/analyst will be approved to begin unsupervised prep/analysis of client samples. Documentation of approval to begin work is defined as the date signed by the Technical Director (or designee) on the Demonstration of Capability Certification form.

5.7.10.8.1.2 Continuing Demonstration of Capability (CDOC). Each technician/analyst must demonstrate continued capability at least every 6 months through the analysis of AIHA LAP provided PT samples or in house laboratory QC samples, i.e. LCS samples. Results must fall within the AIHA LAP PT acceptance criteria or Policy Module 2C, Table 2C-1 LCS control limits per samples used.

5.7.10.8.1.3 All IDOC and CDOC documentation for ELLAP related procedures is maintained and available for review for at least 5 years.

### 5.7.10.8.2 IHLAP Chemistry Specific Technician/Analyst Training Requirements:

#### 5.7.10.8.2.1 Initial demonstration of capability.

Each technician/analyst must complete at least 20 days of work/training in the prep and/or metals analysis lab using technologies/instrumentation similar to that used for IH samples under the direct supervision of an IH trained technician/analyst prior to unsupervised prep and/or analysis of IH regulated client samples. Each analyst/technician must read, understand and agree to follow the laboratory SOP as documented using the SOP Acknowledgement sign-off form. Each technician / analyst must prep and/or analyze as appropriate at least 2 blind reference material samples (concentration unknown to the technician/analyst). These samples may be AIHA LAP provided PT samples or laboratory prepared Certified Reference Material added to the method specific media used for client samples. Results must fall within the PT acceptance range or laboratory LCS range as appropriate. Once all requirements in 5.7.10.8.2.1 have been met, the technician/analyst will be approved to begin unsupervised prep/analysis of client samples. Documentation of formal approval to begin work is defined as the date signed by the Technical Director on the Demonstration of Capability Certification form.

5.7.10.8.2.2 Continuing Demonstration of Capability (CDOC). Each technician/analyst must demonstrate continued proficiency at least every 6 months through the analysis of AIHA LAP provided PT samples or in house laboratory QC samples, i.e. LCS samples. Results must fall within the AIHA LAP PT acceptance criteria or laboratory established LCS control limits as appropriate. CDOCs are documented via AIHA LAP PT reports or LIMS LCS data as appropriate.

5.7.10.8.2.3 All IDOC and CDOC documentation for IHLAP related procedures is maintained and available for review for at least five (5) years.

5.7.10.8.3 IHLAP Asbestos by PCM Specific Technician/Analyst Training Requirements:

5.7.10.8.3.1 All PCM technicians/analysts must complete a NIOSH 582 equivalent training course and successfully pass the course examination during their training period and prior to beginning unsupervised work on client samples.

5.7.10.8.3.2 Initial demonstration of capability.

Each technician/analyst must complete at least 20 days of work/training in the PCM analysis lab using technologies/instrumentation similar to that to be used for IH/PCM samples under the direct supervision of an IH/PCM trained technician / analyst prior to unsupervised prep and/or analysis of IH/PCM regulated client samples. Each analyst/technician must read, understand and agree to follow the laboratory SOP as documented using the SOP Acknowledgement sign-off form.

Each technician/analyst must prep and/or analyze as appropriate at least 2 blind reference material test samples (concentration unknown to the technician/analyst). These samples may be an AIHA LAP provided PT samples or laboratory prepared Reference Slides. Results must fall within the PT acceptance range or laboratory reference slide counting acceptance ranges as appropriate.

Once all requirements in 5.7.10.8.3.2 have been met, the technician/analyst will be approved to begin unsupervised prep/analysis of client samples. Documentation of formal approval to begin work is defined as the date signed by the Technical Director on the Demonstration of Capability Certification form.

5.7.10.8.3.3 Continuing Demonstration of Capability (CDOC).

Each technician/analyst must demonstrate continued proficiency at least every 6 months through the analysis of AIHA LAP provided PT samples or laboratory prepared Reference Slides. Results must fall within the AIHA LAP PT acceptance criteria or laboratory reference slide counting acceptance ranges as appropriate. CDOCs are documented via AIHA LAP PT reports or in the QC data log books maintained in the PCM laboratory as appropriate.

5.7.10.8.3.4 All IDOC and CDOC documentation for IHLAP related procedures is maintained and available for review for at least 5 years.

5.7.10.8.4 EMLAP Specific Technician Training Requirements:

5.7.10.8.4.1 EMLAP laboratory technicians must meet minimum educational requirements of a high school diploma or GED.

5.7.10.8.4.2 Initial demonstration of capability.

Each technician must complete at least 6 months documented training for Air Direct Exam (spore trap) and work/training in the EMLAP microbiology laboratory under the direct supervision of an EMLAP trained technician / analyst prior to performing unsupervised technician level work on EMLAP regulated client samples.

## Environment Testing

Each technician must read, understand and agree to follow the laboratory SOP as documented using the SOP Acknowledgement sign-off form.

Technician level personnel are limited to preparatory operations and assistance in all steps leading to the identification of microorganisms and may not perform analyses or be responsible for the final decisions related to the identity of microorganisms, except as described below:

“Technicians may function as analysts for Air-Direct Examination (spore traps) analysis after completion of 12 months documented on the job training and demonstrated proficiency. During the 12 month analyst training period, the trainee may perform work under the direct supervision of another qualified analyst. All work must be reviewed by another qualified analyst prior to release of data.”

Technicians functioning as analysts shall demonstrate proficiency by successful analysis of EMLAP PT samples or laboratory reference slides to document their ability to identify genus/groups of fungi reported. The technician must also complete and pass the laboratory Fungal Identification Examination/Quiz as administered by the Micro Dept. Manager. Once all requirements in 5.7.10.8.5.2 have been met, the technician will be approved to begin unsupervised prep/analysis of client samples. Documentation of formal approval to begin work is defined as the date signed by the Technical Director on the Demonstration of Capability Certification form.

### 5.7.10.8.4.3 Continuing Demonstration of Capability (CDOC).

Each technician must demonstrate continued proficiency at least every 6 months through the analysis of AIHA LAP provided PT samples or laboratory prepared Reference Slides. Results must fall within the AIHA LAP PT acceptance criteria or laboratory reference slide counting acceptance ranges as appropriate. CDOCs are documented via AIHA LAP PT reports or in the QC data log books maintained in the microbiology laboratory as appropriate.

### 5.7.10.8.4.4 All IDOC and CDOC documentation for EMLAP related procedures is maintained and available for review for at least 5 years

### 5.7.10.8.5 EMLAP Specific Analyst Training Requirements:

#### 5.7.10.8.5.1 EMLAP laboratory analysts must meet minimum educational requirements of a baccalaureate degree in microbiology, biology or related life science.

#### 5.7.10.8.5.2 Initial demonstration of capability.

Each analyst must complete at least 3 months of documented training from Air Direct Exam (spore trap) and at least 6 months of work/training in the EMLAP microbiology laboratory prior to performing unsupervised work on EMLAP regulated client samples. Each analyst must read, understand and agree to follow the laboratory SOP as documented using the SOP Acknowledgement sign-off form. Each analyst must prep and/or analyze as appropriate at least 2 blind reference material test samples. These samples may be an AIHA LAP provided PT samples or laboratory prepared Reference Slides. Results must fall within the PT acceptance range or laboratory reference slide counting acceptance ranges as appropriate and document proper identification of genus/species and genus/groups of fungi reported.

Once all requirements in 5.7.10.8.5.2 have been met, the technician/analyst will be approved to begin unsupervised prep/analysis of client samples. Documentation of formal approval to begin work is defined as the date signed by the Technical Director on the Demonstration of Capability Certification form.

5.7.10.8.5.3 Continuing Demonstration of Capability (CDOC). Each technician/analyst must demonstrate continued proficiency at least every 6 months through the analysis of AIHA LAP provided PT samples or laboratory prepared Reference Slides. Results must fall within the AIHA LAP PT acceptance criteria or laboratory reference slide counting acceptance ranges as appropriate. CDOCs are documented via AIHA LAP PT reports or in the QC data log books maintained in the microbiology laboratory as appropriate.

5.7.10.8.5.4 All IDOC and CDOC documentation for EMLAP related procedures is maintained and available for review for at least 5 years.

5.7.11 The Method Detection Limit (MDL). MDL studies are performed initially for a test and verified quarterly. Reverification occurs annually within 13 months of the initial MDL study. The MDL Procedure is as follows:

5.7.11.1 Estimate the MDL

5.7.11.1.1 Use the previous MDL study.

5.7.11.1.2 Use 3 times the standard deviation of (low level ideally) spikes.

5.7.11.1.3 Determine the concentration or region of your calibration curve where there is a significant change in sensitivity and use that concentration.  
(This could also be at your instrument's limitation to detect.)

5.7.11.2 Determine the Initial MDL

5.7.11.2.1 Determination of the Blank MDL ( $MDL_b$ ) using method blank values for certain analytes is the first step to determining an MDL. For those analytes that show identified concentrations in Method Blanks, enter the values into the MDL spreadsheet (that is posted with the MDL procedure) and determine the MDL. If some but not all of the method blanks for individual analytes give numerical results, set the MDL equal to the highest result.

5.7.11.2.2 Determination of the Spiked MDL ( $MDL_s$ ) - Next perform the Spiked MDL ( $MDL_s$ ) study in one of the following ways

5.7.11.2.2.1 Single Instrument Spiked MDL

5.7.11.2.2.1.1 Prepare and analyze at least seven replicates at a concentration determined by the estimated MDL procedure. These seven replicates must be prepared in at least three separate batches and analyzed (run) on three different days. (Run each of the 3 batches on different days.) Enter the values obtained into the MDL spreadsheet (that is posted with the MDL procedure).

5.7.11.2.2.1.2 Use 2 or 3 study replicate values (for a total of 5) from the previous two MDL studies performed within the last 24 months assuming the spike concentration used for those studies is the



same concentration to be used for the initial MDL determination. In addition, prepare and analyze at least two more replicates at the same concentration. Populate the MDL spreadsheet with those values.

5.7.11.2.2.1.3 Submit both spreadsheets to the Department Manager or the QA Manager for review and approval.

## 5.7.11.2.2.2 Multiple Instrument Spiked MDL

5.7.11.2.2.2.1 Prepare and analyze at least two replicates per instrument (minimum seven total replicates) at a concentration determined by the estimated MDL procedure. Replicates must be prepared in at least three separate batches and analyzed (run) on three different days. Enter the values obtained into the MDL spreadsheet (that is posted with the MDL procedure).

5.7.11.2.2.2.2 Use 2 or more study replicate values per instrument from the previous two instruments' MDL studies performed within the last 24 months assuming the spike concentration used for those studies is the same concentration to be used for the initial MDL determination. Enter these values into the MDL spreadsheet.

5.7.11.2.2.2.3 Submit both spreadsheets to the Department Manager or the QA Manager for review and approval.

5.7.14.1 Method Blank (MB). For each method, the analyst must analyze reagent water blank daily to demonstrate that interferences from the analytical system is under control. The method blank is treated in the same manner as any sample, including any sample preparations such as digestions and extractions.

5.7.12.1 In the method blank, the concentration of any analyte of interest should not exceed the laboratory established practical quantitation limit (PQL). If contamination is detected in the blank, one of the following conditions must be met, or re-analysis of all associated samples is required (Section 5.8, Out of Control Procedures).

5.7.12.1.1 With documentation of client approval, the PQL may be increased above the level of contamination in the method blank and the associated samples. Report data with a "B" qualifier.

5.7.12.1.2 For sample results greater than or equal to 10 times the concentration of the method blank, the data may be reported with a flag indicating that low level contamination was detected in the method blank. Report data with a "B" qualifier.

5.7.13 Surrogates and Surrogate Recovery measured during the analysis of organic compounds. In order to monitor sample extraction efficiency, all client samples, blanks, and QC samples are fortified with surrogate spiking compounds before extraction and injection into the instrument.

5.7.13.1 Acceptance Criteria: Acceptable surrogate recoveries are contained in LIMS.

5.7.13.2 At a minimum, the laboratory annually updates surrogate recovery limits on a matrix-by-matrix basis for each test method.

5.7.13.3 If the surrogate recovery fails the above stated acceptance criteria, the analyst must proceed according to the out-of-control procedures discussed in Section 5.8.

5.7.13.4 Calibration curves. At a minimum, a 5 point calibration curve must be developed for each surrogate that is used in a particular test method.

5.7.14.2 Internal standard retention time - The retention times of the internal standards in the calibration verification standard must be evaluated immediately after or during GC or GC/MS acquisition.

5.7.14.2.1 If the retention time for any internal standard changes by more than 30 seconds from the retention time of the mid-point standard in the most recent initial calibration sequence, then the chromatographic system must be inspected for malfunctions and corrections must be made. Proceed according to the out-of-control procedures discussed in Section 5.8.

5.7.14.2.2 Internal standard response – If the area for any of the internal standards in the ICV or CCV changes by more than a factor of two (-50% to +100%) from that of the mid-point standard level in the most recent initial calibration sequence, the mass spectrometer or GC system must be inspected for malfunctions and corrections must be made unless the exceedance is caused by matrix interference. Proceed according to the out-of-control procedures discussed in Section 5.8.

5.7.14.3 Determination of Retention Time Window. Before establishing windows, be certain that the GC, GC/MS, or HPLC system is within optimum operating conditions. To determine the retention time window, make three injections of the sought for standard(s) or analyte(s) throughout the course of a 72 hour period. Serial injections over less than a 72-hour period result in retention time windows that are too tight.

5.7.14.3.1 Calculate the standard deviation of 3 absolute retention times for the standard(s).

5.7.14.3.2 The retention time window for individual peaks is defined as plus-or-minus (+/-) three (3) times the standard deviation of the absolute retention time.

5.7.14.3.3 In those cases where the standard deviation for a particular analyte is zero, the laboratory should use +/- 0.05 minutes as a retention time window.

5.7.14.3.4 The laboratory must calculate retention time windows for each standard on every existing GC column and on each new GC column when it is installed. The data is be retained by the laboratory for a period of 5 years.

5.7.14.4 For TCLP analysis, a matrix spike should be prepared and analyzed for each waste type (e.g., oil, solid) associated with a batch of 20 or fewer samples of similar matrix.

5.7.15 Additional Quality Control Parameters Required for Metals Analysis by 7000 Series Methods.

5.7.15.1 Dilution test. For each analytical batch, select one typical sample for serial dilution to determine whether interferences are present. The concentration of the analyte should be at least 25 times the estimated detection limit.

5.7.15.1.1 Determine the apparent concentration in the undiluted sample. Dilute the sample by a minimum of five fold (1 + 4) and reanalyze.

5.7.15.1.2 If all of the samples in the batch are below 10 times the detection limit(s), perform the spike recovery analysis.

5.7.15.1.3 Agreement within 10% between the concentration of the undiluted sample and five times the concentration of the diluted sample indicates the absence of interferences, and such samples may be analyzed without using the method of standard additions.

5.7.15.2 Spike Recovery Test: If results from the dilution test do not pass (or if none of samples in the batch are at a concentration level 10 times the MDL) the spike recovery test must be performed.



- 5.7.15.2.1 Withdraw another aliquot of the test sample and add a known amount of analyte to bring the concentration of the analyte to 2 to 5 times the original concentration.
- 5.7.15.2.2 If all of the samples in the batch have analyte concentrations below the detection limit, spike the selected sample at 20 times the detection limit.
- 5.7.15.2.3 Analyze the spiked sample and calculate the spike recovery. If the recovery is less than 85% or greater than 115%, the method of standard additions shall be used for all samples in the batch or data qualified and narrated with client report.

## 5.7.16 Additional Quality Control Parameters Required for Metals Analysis by ICP Methods.

5.7.16.1 The upper limit of the linear dynamic range must be established for each wavelength utilized. This is accomplished by measuring the signal response of a standard that is 10% higher than the upper range of the calibration curve.

5.7.16.2 The laboratory must establish and verify every six months an inter-element spectral interference correction routine to be used during sample analysis. See the individual ICP method SOPs for instructions on performing this test.

5.7.16.3 Duplicate or matrix spike duplicate samples. For all target metals, one sample per analytical batch is digested and analyzed in duplicate or as matrix spike duplicate. The results are compared and should meet the precision control limits established.

5.7.16.4 An instrument blank should be run after any sample giving a response that exceeds the calibration range of the instrument. This is done to show that there is no carry-over to the next analysis. The instrument blank shall consist of a high purity solvent (e.g., hexane for pesticide analysis by GC/ECD, methylene chloride for semi-volatiles analysis by GC/MS).

## 5.7.17 Additional Quality Control Parameters Required for Microbiological Test Methods.

5.7.17.1 Laboratory water quality must be checked and documented at the frequency indicated in the following table.

Table 5-2 Laboratory Water Quality Criteria

| Requirement                        | Criteria                         | Frequency                  |
|------------------------------------|----------------------------------|----------------------------|
| pH                                 | 5.5-7.5                          | Each day test is performed |
| Residual Chlorine                  | <1.0 mg/L                        | Each day test is performed |
| Conductivity                       | <1.0 $\mu$ mho/cm @25°C          | Each day test is performed |
| Heterotrophic Plate Count          | <500 colony forming units/ml     | Monthly                    |
| Bacteriological Ratio              | 0.8-3.0                          | Annually                   |
| Cd, Cr, Cu, Ni, Pb, Zn             | <0.05 mg/L each, total <1.0 mg/L | Annually                   |
| NH <sub>3</sub> , Organic Nitrogen | <0.1 mg/L                        | Monthly                    |
| TOC                                | <1.0 mg/L                        | Monthly                    |
| Student's t value                  | <2.78 (Annual use test)          | Annually                   |

5.7.17.2 The laboratory maintains records of monthly checks on sterile water and membrane filters as evidence of trends in contamination levels for microbiology through Heterotrophic Plate Count measurements. If the contamination level exceeds 1000 CFU/ml, all equipment should be checked for sterility and re-sterilized as necessary. In addition, if additional testing indicates that the problem is still present, then the room used for bacteriological testing should be cleaned with a disinfectant soap and plate counts measured again. Repeat the process as necessary.

## 5.8 Procedures for Assessing and Treating Out-of-Control Situations.

- 5.8.1 Quality control analyte samples consist of the following: Method Blanks, Duplicates, Laboratory Control Sample, Laboratory Control Sample Duplicate, Matrix Spike, Matrix Spike Duplicate, Initial Calibration Verification, Continuing Calibration Verification, BFB and DFTPP tunes, internal standards, surrogates, post digestion spikes, and dilution tests.
- 5.8.2 If any of the quality control analyte recovery values are outside either the laboratory or method-established control limit(s), they are considered to be out-of-control.
- 5.8.3 The resolution of an out-of-control situation, with identification and correction of the root cause, must be documented prior to initiating subsequent analyses. Documented corrective action (which may or may not require re-analysis) must also be performed if any of the recovery values in the LCS exhibit any "out-of- control" patterns.
- 5.8.4 Out-of-control conditions include the following special situations:
  - 5.8.4.1 When the acceptance criteria for the continuing calibration verification has a high bias and there are associated samples that are non-detects, then the non-detects may be reported. Otherwise, the samples affected by the unacceptable calibration verification shall be re-analyzed after the source of the problem has been corrected.
  - 5.8.4.2 When the acceptance criteria for the continuing calibration verification have a low bias, those sample results may be reported if they exceed a maximum regulatory limit or decision level. Otherwise, the samples affected by the unacceptable verification shall be re-analyzed after the source of the problem has been corrected.
  - 5.8.4.3 The root cause of such failures must be investigated and documented in a Non-Conformance Report (NCR). Any corrective actions identified as a result of the investigation must be implemented and documented in a Corrective Action Report (CAR) prior to reprocessing the affected sample batch.
  - 5.8.4.4 The QC requirements for each test method are listed LIMS test codes. They are also posted as charts and tables on the portal server. Unless otherwise indicated, if tables and charts have been produced, the precision and accuracy limits were determined from laboratory data.

## 5.8.5 Risks and Opportunities

The laboratory has adopted a risk management approach to Risk and Opportunities defined in ISO / IEC 17025:2017 section 8.5. This requires the laboratory to determine risks and opportunities, evaluate their severity and impact, and to address these risks with actions that will ultimately improve results and prevent future negative effects.

The laboratory addresses risks and opportunities quarterly as part of the laboratory's quarterly audit by way of the Risk Assessment Table and Chart. Risks are identified via the laboratory and upper management staff by the evaluation of corrective actions, internal audits, complaints, management reviews, procedures, occurrences, meeting discussions, incidents, and personnel suggestions. Each identified risk is recorded in the Risk Assessment Table (Table 5-3) and assigned a score from 1-5 for the likeliness of occurrence. This scale from 1 to 5 gives an indication of the likelihood of the occurrence. (1=Unlikely, 2=Seldom, 3=Occasional, 4=Likely, 5=Definite). In addition, a severity of impact score is assigned from 1-5. This rates the impact of the event, if the event occurred. (1=Insignificant, 2=Marginal, 3=Moderate, 4=Critical, 5=Catastrophic).

These scores are combined. Each score combination correlates to a risk rating, which shows the necessity of action requirement. This risk ratings are Extreme, High, Medium, and Low. This risk

rating prompts an action in accordance with the rating: Extreme - Act Now, High - Further Action Necessary Soon, Medium - Further Action Optional, Low - No Further Action.

The Risk Assessment Chart (Table 5-3) assists with the visualization of the risk severity and corresponds to the Risk Assessment Table, where each risk data point will show up on this “heat map” (termed by the colors used) of Likelihood vs. Impact. The heat map is shaded from green to red, where green indicates low risk and no action is necessary, yellow indicates medium risk and action is optional, orange indicates high risk and action is necessary soon, and red indicates extreme risk and action is needed immediately. In response to these results, actions taken to mitigate the specified risks are detailed in the Risk Assessment Table to track progress.

This Risk Assessment Table and Chart is included in the Quarterly Report to Management.

Identified Risks are mitigated through:

- Training and Awareness
  - Continued Audits (Internal, External, Customer, Third Party)
  - Design and organization for efficiency, reliability, ease, and maintainability
- After implementation of the risk action, the risks are monitored by tracking and evaluating performance, ensure “lesson learned” feedback goes into future planning and activities, and by established metrics (such as QC charting).

All of these stated components will be evaluated by upper and departmental management during the annual management review to verify the effectiveness of the risk resolution.

### 5.8.6 Improvement

Opportunities for improvement can be identified through risk management approach utilizing the Risk Assessment Table and Chart, or by the review of the operational procedures, the use of the policies, overall objectives, audit results, corrective actions, management review, suggestions from personnel, risk assessment, analysis of data, and proficiency testing results.

The laboratory identifies and selects opportunities for improvement and implements the necessary actions in a number of ways.

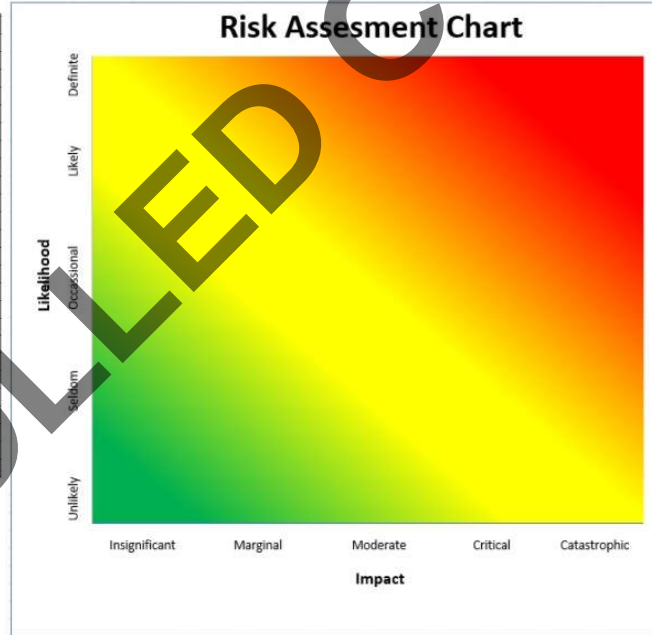
Opportunities for improvement are identified by using the following practices:

1. Corrective Actions
2. Data or QA Review
3. Internal Audits
4. Weekly management meeting discussions
5. Departmental management reviews
6. Proficiency testing results
7. Review of operational procedures
8. Feedback from personnel and clients

As with Risk and Opportunities, improvements will be evaluated by upper and departmental management during the annual management review to verify the effectiveness of the risk resolution.

Table 5-3 Risk Assessment Table and Chart

| Risk Assessment Table          |      |                  |              |                    |
|--------------------------------|------|------------------|--------------|--------------------|
| Description of Identified Risk | Risk | Likelihood (1-5) | Impact (1-5) | Action Requirement |
|                                | R1   |                  |              | Act Now            |
|                                | R2   |                  |              | Act Now            |
|                                | R3   |                  |              | Act Now            |
|                                | R4   |                  |              | Act Now            |
|                                | R5   |                  |              | Act Now            |
|                                | R6   |                  |              | Act Now            |
|                                | R7   |                  |              | Act Now            |
|                                | R8   |                  |              | Act Now            |
|                                | R9   |                  |              | Act Now            |
|                                | R10  |                  |              | Act Now            |
|                                | R11  |                  |              | Act Now            |
|                                | R12  |                  |              | Act Now            |
|                                | R13  |                  |              | Act Now            |
|                                | R14  |                  |              | Act Now            |
|                                | R15  |                  |              | Act Now            |
|                                | R16  |                  |              | Act Now            |
|                                | R17  |                  |              | Act Now            |
|                                | R18  |                  |              | Act Now            |
|                                | R19  |                  |              | Act Now            |
|                                | R20  |                  |              | Act Now            |
|                                | R21  |                  |              | Act Now            |
|                                | R22  |                  |              | Act Now            |
|                                | R23  |                  |              | Act Now            |
|                                | R24  |                  |              | Act Now            |
|                                | R25  |                  |              | Act Now            |



| Risk Rating |                               |
|-------------|-------------------------------|
| Low         | No Further Action             |
| Medium      | Further Action Optional       |
| High        | Further Action Necessary Soon |
| Extreme     | Act Now                       |

| Likelihood     | Impact            |
|----------------|-------------------|
| Unlikely (1)   | Insignificant (1) |
| Seldom (2)     | Marginal (2)      |
| Occasional (3) | Moderate (3)      |
| Likely (4)     | Critical (4)      |
| Definite (5)   | Catastrophic (5)  |

## 5.9 Inter-laboratory QA and QC

- 5.9.1 Each section of the laboratory may be given blind and double blind samples to analyze for requested parameters. Blind samples may be assigned in containers to be diluted, digested, and/or extracted and analyzed by the appropriate laboratory section. Double-blind samples arrive on a pre-scheduled basis from a “client” as real samples to be analyzed by designated analytical sections for specific analytes.
- 5.9.2 Blind QC samples may be used as a test of proficiency for analysts needing certification and/or qualification for performing an analysis. The Section Supervisor should obtain the QC sample from, either, the Quality Assurance Department or from a source independent of the source of standards for the analysis.
- 5.9.3 Double blind samples represent quality control samples whose analyte concentrations are known to, either, an outside source, such as a client, or an inside source, such as the Quality Control Manager, Project Managers, or the Technical Director.
  - 5.9.3.1 Double blind samples will arrive in the lab as real samples and their identity will not be known to anyone as quality control samples except for Quality Assurance and Department Manager.
  - 5.9.3.2 The results of these double-blind samples will be sent to the “client” to be compared to the true value of the samples. The laboratory’s performance on these samples may be compared to other laboratories in the program (if applicable). These results will be mailed to the Quality Assurance Department.
  - 5.9.3.3 When the double blind samples are created within the laboratory, a report will be generated by the Quality Assurance Manager or the Technical Director that indicates the true value of the analyte. These values will be compared to the reported value by the laboratory. The analysis of double blind samples is used as an aid to improve quality control within the laboratory.

## 5.10 Sample Dilution

- 5.10.1 All instruments are periodically calibrated with calibration curves. The calibrations typically are developed by comparison of area or intensity against sample concentration. Per the requirements of the various accreditation agencies, the calibrations are verified initially and periodically, usually every day or every 12 hours.
- 5.10.2 Various test methods additionally require that the linear range of the instrument is determined on a specified frequency.
- 5.10.3 In the event that a measured sample concentration exceeds the concentration of the highest calibration standard or the linear range of the instrument (where determined), the sample must be diluted per the following procedure.
  - 5.10.3.1 The analyst should attempt to dilute the sample so that the measured concentration of the diluted sample is approximately 60% that of the highest standard in the calibration curve.
  - 5.10.3.2 Sample must be diluted with the same matrix as the undiluted sample as indicated below.
    - 5.10.3.2.1 Aqueous samples are diluted with reagent grade distilled water.
    - 5.10.3.2.2 Extracts in solvents are diluted with the same solvent of the same purity.
    - 5.10.3.2.3 ICP digestates are diluted with nitric acid or hydrochloric acid-water mixtures that emulate the original matrix.



5.10.3.3 The sample dilution is reported in the LIMS and on the data sheet. The results are reported to the client and the reporting limits are automatically adjusted by the LIMS system to account for the sample dilution.

Table 5-4 Summary of Calibration and QC Procedures for Various Tests

| Method                 | QC Check                                              | Frequency                                                                                                                                                                                                                                                                                                    | Acceptance Criteria                                                                     | Corrective Action (3,4)                                                                                                      |
|------------------------|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| SW-8081B<br>Pesticides | Five-point initial calibration for all analytes       | Initial calibration prior to sample analysis                                                                                                                                                                                                                                                                 | RF = 20%                                                                                | Correct problem then repeat initial calibration                                                                              |
| SW-8082A<br>PCB        |                                                       |                                                                                                                                                                                                                                                                                                              | Linear - least squares regression<br>$r > 0.995$                                        |                                                                                                                              |
| SW-8151A<br>Herbicides | Second source calibration verification standard (ICV) | Once per five point initial calibration - from second source.                                                                                                                                                                                                                                                | All analytes within 15% of target value<br>GRO/DRO = 15% PRO = 20%                      | Correct problem then repeat initial calibration                                                                              |
| SW-8015C<br>Organics   | Retention time window                                 | System set-up                                                                                                                                                                                                                                                                                                | 3 times standard deviation for each analyte retention time from 72 hour study           | Correct problem then re-analyze all samples analyzed since retention time check                                              |
| GRO<br>DRO<br>FL-PRO   | Continuing calibration verification                   | Before sample analysis, after every 10 samples, and at the end of the analysis sequence with varying concentrations<br>GRO/DRO Every 12 hours before sample analysis, after every 10 samples, and at the end of the analytical sequence<br>GRO/DRO = RT window<br>required analyzed at same frequency as CCV | All analytes within 15% of target value<br>GRO/DRO = 20% PRO = 25%<br>8081B/8082A = 20% | Correct problem then repeat initial continuing calibration verification and re-analyze all samples since last successful CCV |
| SW-8315A<br>Carbonyls  | Breakdown check (Endrin and DDT)(1)                   | Daily prior to analysis of samples                                                                                                                                                                                                                                                                           | Degradation <15%                                                                        | Inlet column maintenance; repeat breakdown check. Correct problem                                                            |
|                        | Method Blank                                          | Once per analytical batch                                                                                                                                                                                                                                                                                    | No analytes detected > PQL                                                              | Then re-prepare and analyze the method and all samples processed with the contaminated blank.                                |
|                        | LCS/LCSD                                              | One per prep batch                                                                                                                                                                                                                                                                                           | See LIMS Test codes                                                                     | Re-prepare and analyze the LCS/LCSD & all samples in the affected batch                                                      |
|                        | Surrogate Spike                                       | Every sample, spiked sample, standard, and method blank                                                                                                                                                                                                                                                      | See LIMS Test codes                                                                     | Check system, re-inject, re-extract                                                                                          |
|                        | MS/MSD                                                | One per prep batch                                                                                                                                                                                                                                                                                           | See LIMS Test codes                                                                     | None - Narrate the results in LIMS                                                                                           |
|                        | IDOC                                                  | Every time a new analyst performs the test method for the first time - second source.                                                                                                                                                                                                                        | See LIMS Test codes                                                                     | Analyst cannot perform the test method until the IDOC passes method criteria                                                 |
|                        | LLOQ                                                  | Initial<br>Annually                                                                                                                                                                                                                                                                                          | LCS range $\pm 20\%$<br>0.5-2 times established LLOQ                                    | Re-evaluate, repeat study                                                                                                    |
|                        | MDL                                                   | Initial Blank & Spike MDL Study<br>Quarterly Verification. Annual<br>MDL Study Re verification                                                                                                                                                                                                               | MDL < Spike Level<br>Analyte specific per test                                          | Re verification, repeat study                                                                                                |
|                        | Second column confirmation (2)                        | 100% for all positive results (not for 8015B)                                                                                                                                                                                                                                                                | Same results as primary column analysis                                                 | Only report the results that match. Use the highest results                                                                  |
| SW-8260D<br>SW-8270E   | Tune BFB for 8260B<br>Tune DFTPP for 8270D            | Prior to initial calibration<br>Prior to initial calibration                                                                                                                                                                                                                                                 |                                                                                         | Analyst cannot perform the test until the tune passes method criteria                                                        |
|                        | Five-point initial calibration for all analytes       | Initial calibration prior to sample analysis.                                                                                                                                                                                                                                                                |                                                                                         | Correct problem then repeat initial calibration                                                                              |
|                        | Second source calibration verification standard (ICV) | Once per five point initial calibration-second source.                                                                                                                                                                                                                                                       | All analytes within 30% of target value                                                 | Correct problem then repeat initial calibration                                                                              |
|                        | Retention time window                                 | Each Sample                                                                                                                                                                                                                                                                                                  | Relative retention time (RRT) of                                                        | Correct problem then re-analyze                                                                                              |



| Method               | QC Check                                              | Frequency                                                                                   | Acceptance Criteria                                                                                                                                                                        | Corrective Action (3,4)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      | calculated for each analyte                           |                                                                                             | the analyte within 0.06 RRT units of the RRT                                                                                                                                               | all samples analyzed since retention time check                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                      | Continuing calibration verification                   | Daily prior to analysis of samples and every 12 hours of analysis time.                     |                                                                                                                                                                                            | Correct problem then repeat initial continuing calibration verification and re-analyze all samples since last successful CCV. If not met the system should be evaluated, and corrective action should be taken before analysis. If criterion is not met for more than 20% of the compounds included in the initial calibration, then corrective action must be taken prior to analysis of samples. Inspect GC/MS for malfunctions; mandatory re-analysis of samples analyzed while system was malfunctioning. Correct problem then re-prepare and analyze method blank and all samples processed with the Contaminated blank. |
| SW-8260D<br>SW-8270E | Internal Standards                                    | Every sample/standard                                                                       | Target compounds $\leq 20\%$<br>Retention Time RT $\pm 30$ seconds from RT of the mid-point in the CCV/ICAL (sample/standard)<br>EICP area within -50% to +100% of ICAL mid-point standard |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                      | Internal Standards                                    | Every sample/standard                                                                       | Target compounds $\leq 20\%$                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                      | Method Blank                                          | Once per analytical batch                                                                   | No analytes detected > PQL                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                      | LCS/LCSD                                              | One per prep batch                                                                          | See LIMS Test codes                                                                                                                                                                        | Re-prepare and analyze the LCS/LCSD and all samples in the affected analytical batch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                      | Surrogate Spike                                       | Every sample, spiked sample, standard, and method blank                                     | See LIMS Test codes                                                                                                                                                                        | Check system, re-inject, re-extract                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                      | MS/MSD                                                | One per prep batch                                                                          | See LIMS Test codes                                                                                                                                                                        | None - Narrate the results in LIMS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                      | IDOC                                                  | Every time a new analyst performs the test method for the first time - second source.       | See LIMS Test codes<br>LCS Accuracy for Limits                                                                                                                                             | Analyst cannot perform the test method until the IDOC passes method criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                      | LLOQ                                                  | Initial<br>Annually                                                                         | LCS range $\pm 20\%$<br>0.5-2 times established LLOQ                                                                                                                                       | Re-evaluate, repeat study                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                      | MDL                                                   | Initial Blank & Spike MDL Study<br>Quarterly Verification. Annual MDL Study Re verification | MDL < Spike Level<br>Analyte specific per test                                                                                                                                             | Re verification, repeat study                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| SW-7000B<br>Metals   | 3-point initial calibration (min. 3 stds and a blank) | Daily initial calibration prior to sample analysis                                          | Correlation coefficient $> 0.995$ for linear regression                                                                                                                                    | Correct problem then repeat initial calibration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                      | Second source calibration verification standard (ICV) | Once per initial daily calibration second source.                                           | All analytes within 10% of target value                                                                                                                                                    | Correct problem then repeat initial calibration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                      | Continuing calibration verification                   | Before sample analysis, after every 10 samples, and at the end of the analysis sequence     | All analytes within 20% of target value                                                                                                                                                    | Correct problem then repeat initial continuing calibration verification and re-analyze all samples since last successful CCV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                      | Method Blank                                          | Once per analytical batch                                                                   | No analytes detected > PQL                                                                                                                                                                 | Correct problem then re-prepare and analyze method blank and all samples processed with that blank.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                      | LCS/LCSD                                              | One per prep batch                                                                          | See LIMS Test codes                                                                                                                                                                        | Re-prepare and analyze the LCS/LCSD and all samples in the affected batch.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                      | MS/MSD                                                | One per prep batch                                                                          | See LIMS Test codes                                                                                                                                                                        | None - Narrate the results in LIMS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                      | IDOC                                                  | Every time a new analyst performs the test method for the first time - second source.       | See LIMS Test codes<br>LCS Accuracy for Limits                                                                                                                                             | Analyst cannot perform the test method until the IDOC passes method criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                      | LLOQ                                                  | Initial<br>Quarterly                                                                        | Spike $\pm 35\%$ , RSD $< 20\%$<br>Spike $\pm 35\%$ , RSD $< 20\%$                                                                                                                         | Re-evaluate, repeat study                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                      | MDL                                                   | Initial Blank & Spike MDL Study<br>Quarterly Verification. Annual MDL Study Re verification | MDL < Spike Level<br>Analyte specific per test                                                                                                                                             | Re verification, repeat study                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                      | Dilution test: 1:4 dilution                           | Each preparatory batch                                                                      | Five times dilution sample result                                                                                                                                                          | Perform post digestion spike                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Method                           | QC Check                                              | Frequency                                                                                                     | Acceptance Criteria                                                                                                                                     | Corrective Action (3,4)                                                                                                      |
|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
|                                  |                                                       | Sample concentration must be 20X MDL                                                                          | must be within 10% of the undiluted sample result                                                                                                       | addition                                                                                                                     |
|                                  | Recovery Test                                         | When dilution test fails or sample concentration < 20X MDL                                                    | Recovery within 15% of target results                                                                                                                   | Perform method of standard additions                                                                                         |
| SW-9010C<br>CN Distil<br>Cyanide | Initial calibration (six standards and a blank)       | Daily initial calibration prior to sample analysis                                                            | Correlation coefficient >0.995 for linear regression                                                                                                    | Correct problem then repeat initial calibration                                                                              |
|                                  | Distilled standards (one high and one low)            | Once per initial daily calibration                                                                            | All analytes within 10% of target value                                                                                                                 | Correct problem then repeat initial calibration                                                                              |
|                                  | Second source calibration verification standard (ICV) | Once per initial daily calibration second source.                                                             | All analytes within 15% of target value                                                                                                                 | Correct problem then repeat initial calibration                                                                              |
|                                  | Continuing calibration verification                   | Before sample analysis, after every 10 samples, and at the end the analysis sequence - varying concentrations | All analytes within 15% of target value                                                                                                                 | Correct issue, repeat initial continuing calibration verification and re-analyze all samples since last successful CCV.      |
|                                  | Method Blank                                          | Once per analytical batch                                                                                     | No analytes detected > PQL                                                                                                                              | Correct problem, re-prepare and analyze method blank and all samples processed w/ contaminated blank.                        |
|                                  | LCS/LCSD                                              | One per prep batch                                                                                            | All analytes within 15% of target value                                                                                                                 | Re-prepare, reanalyze the LCS/LCSD and all samples in the analytical batch                                                   |
|                                  | MS/MSD                                                | One per prep batch (9010B)<br>Every 10 samples (9012A)                                                        | All analytes within 30% of target value                                                                                                                 | None - Narrate the results in LIMS                                                                                           |
|                                  | IDOC                                                  | Every time a new analyst performs the test method for the first time - second source.                         | See LIMS Test codes<br>LCS Accuracy for Limits                                                                                                          | Analyst cannot perform the test method until the IDOC passes method criteria                                                 |
|                                  | LLOQ                                                  | Initial<br>Quarterly                                                                                          | Spike +35%, RSD <20%<br>Spike +35%, RSD <20%                                                                                                            | Re-evaluate, repeat study                                                                                                    |
|                                  | MDL                                                   | Initial Blank & Spike MDL Study<br>Quarterly Verification: Annual MDL Study Re verification                   | MDL < Spike Level<br>Analyte specific per test                                                                                                          | Re verification, repeat study                                                                                                |
| EPA-624.1<br>EPA-625.1           | Tune BFB for 8260B<br>Tune DFTPP for 8270C            | Prior to initial calibration and continuing calibration verification every 12 hours                           | See individual method for tune criteria.                                                                                                                | Analyst cannot perform the test method until the tune passes method criteria                                                 |
|                                  | 5-point initial calibration for all analytes          | Initial calibration prior to sample analysis                                                                  | %RSD<35%                                                                                                                                                | Correct problem then repeat initial calibration                                                                              |
|                                  | Second source calibration verification standard (ICV) | Once per 5 point initial calibration                                                                          | All analytes within range of method criteria (SOPs/Methods)                                                                                             | Correct problem then repeat initial calibration                                                                              |
|                                  | Continuing calibration verification                   | Daily prior to analysis of samples - varying concentration.                                                   | All calibration analytes within Range of method specified criteria (SOPs/Methods)                                                                       | Correct problem then repeat initial continuing calibration verification and re-analyze all samples since last successful CCV |
|                                  | Internal Standards                                    | Every sample/standard                                                                                         | Retention time +/-30 seconds from retention time of the mid-Point in the CCV/ICAL                                                                       | Inspect GC/MS for malfunctions; mandatory re-analysis of samples analyzed while system was malfunctioning.                   |
|                                  | Retention time window calculated for each analyte     | Each Sample                                                                                                   | Relative retention time (RRT) of the analyte within 30 seconds of the RT (sample/standard)<br>EICP area within -50% to +100% of ICAL mid-point standard | Correct problem then re-analyze all samples analyzed since retention time check                                              |
|                                  | Method Blank                                          | Once per analytical batch                                                                                     | No analytes detected > PQL                                                                                                                              | Correct problem then re-prepare and analyze method blank and all samples                                                     |

| Method                 | QC Check                                                                  | Frequency                                                                                                             | Acceptance Criteria                                                                   | Corrective Action (3,4)                                                              |
|------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|                        |                                                                           |                                                                                                                       |                                                                                       | processed with this blank.                                                           |
|                        | LCS/LCSD                                                                  | One per prep batch                                                                                                    | See LIMS Test codes                                                                   | Re-prepare and analyze the LCS/LCSD and all samples in the affected analytical batch |
|                        | Surrogate Spike                                                           | Every sample, spiked sample, standard, and method blank                                                               | See LIMS Test codes                                                                   | Check system, re-inject, re-extract                                                  |
|                        | MS/MSD                                                                    | One per prep batch                                                                                                    | See LIMS Test codes                                                                   | None - Narrate the results in LIMS                                                   |
|                        | IDOC                                                                      | Every time a new analyst performs the test method for the first time - second source.                                 | See LIMS Test code or QC Charts LCS Accuracy for Limits                               | Analyst cannot perform the test method until the IDOC passes method criteria         |
|                        | MDL                                                                       | Initial Blank & Spike MDL Study Quarterly Verification. Annual MDL Study Re-verification                              | MDL < Spike Level<br>Analyte specific per test                                        | Re verification, repeat study                                                        |
| TO-14A<br>TO-15<br>VOC | New Canister Check                                                        | New - pressurize with humidified UHP nitrogen; analyze after aging 24 hours to determine cleanliness                  | demonstrate <0.2ppb of target analytes                                                | Re-clean canister and retest                                                         |
|                        | Canister Leak Check                                                       | Pressurize to 30 psig and check pressure after 24 hours                                                               | Pressure should not vary more than +/- 2 psig over 24 hours                           | Repair canister and retest                                                           |
|                        | Canister Blank Check                                                      | Pressurize to 30 psig with humidified UHP nitrogen                                                                    | demonstrate <0.2ppbv of target analytes; requires 24 hours of aging prior to analysis | Re-clean canister and retest                                                         |
|                        | Sampling System Certification (Zero Air Certification using UHP Nitrogen) | Pass humidified UHP nitrogen through sampling system and demonstrate <0.2ppbv of target analytes                      | demonstrate <0.2ppbv of target analytes                                               | Re-clean canister and retest                                                         |
|                        | Dynamic Calibration System Certification                                  | Pass humidified UHP nitrogen through the dynamic calibration system                                                   | demonstrate <0.2ppbv of target analytes                                               | Clean system and retest                                                              |
|                        | Sampler System Certification                                              | Use humidified gas standards to compare results from a canister collected with the sampling system and on-line GC-MS  | Recovery between 90 and 110%                                                          | Clean system and retest                                                              |
|                        | Instrument Performance Check (BFB Tuning)                                 | Prior to the analysis of any samples, blanks, or calibration standards, load 50 ng or less of BFB every 24 hours      | Verify the mass spectral ion abundance is in accordance with Table 7-1 of SOP         | Retune or perform routine maintenance then retune                                    |
|                        | Initial Calibration (ICal)                                                | Prior to analysis of samples and blanks but after the instrument performance check (following any corrective action): | R <sup>2</sup> >0.995                                                                 | Correct problem and recalibrate                                                      |
|                        |                                                                           | Variation of Relative Response Factor (RRF)                                                                           | <30% RSD for the RRF each target analyte                                              | Correct problem and recalibrate                                                      |
|                        |                                                                           | Variation of Relative Retention Time (RRT)                                                                            | Each standard within 0.06 RRT Units of mean for each analyte                          | Correct problem and recalibrate                                                      |
|                        | Internal Standard (IS) ICAL Response                                      | Each IS response                                                                                                      | Must be within 40% of the mean response over the ICAL                                 | Correct problem and recalibrate                                                      |
|                        |                                                                           | IS ICAL Retention Time                                                                                                | Each IS should be within 20 s of the mean retention time over the ICAL                |                                                                                      |
|                        | Daily Calibration                                                         | Prior to the analysis of samples                                                                                      | Must be within +/- 30% for ICAL                                                       | Reanalyze; if still fails, perform                                                   |

| Method                        | QC Check                                               | Frequency                                                                                              | Acceptance Criteria                                                                                                                                        | Corrective Action (3,4)                                                                                                      |
|-------------------------------|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
|                               | (Continuing Calibration Verification-CCV)              | and blanks but after tuning criteria have been met, analyze mid-level standard                         | for each target analyte                                                                                                                                    | instrument maintenance and reanalyze                                                                                         |
|                               | Laboratory Method Blank (LMB)                          | Analyze one every 24 hours; pressurize (2 atm) clean canister with >20% relative humidity UHP nitrogen | Blank should not contain any target analyte greater than PQL. Each IS response in the blank must be within +/- 0.33 minutes of the most recent calibration | Reanalyze; prepare new canister and analyze                                                                                  |
| TO-14A                        |                                                        |                                                                                                        |                                                                                                                                                            |                                                                                                                              |
| TO-15                         |                                                        |                                                                                                        |                                                                                                                                                            |                                                                                                                              |
| VOC                           |                                                        |                                                                                                        |                                                                                                                                                            |                                                                                                                              |
|                               | Sample Technical Acceptance Criteria                   | Analyzed on a GCMS system                                                                              | Meeting the BFB Tune, ICAL, and continuing calibration criteria outlined in SOP                                                                            | Reanalyze sample. Qualify / Narrate data appropriately                                                                       |
|                               |                                                        | Analyzed with a LMB meeting criteria                                                                   | Must meet method in SOP. All target analytes within ICAL range. Ea. IS RT within +/- 30% minutes of the most recent calibration.                           |                                                                                                                              |
| EPA-245.1 Mercury             | Initial calibration (minimum 5 standards and a blank). | Daily initial calibration prior to sample analysis.                                                    | Correlation coefficient >0.995 for linear regression.                                                                                                      | Correct problem then repeat initial calibration.                                                                             |
|                               | Linear Dynamic Range                                   | Once Annually                                                                                          | Analyte within 10% of target value (not necessary if diluting within calibration curve).                                                                   | Calibration range lowered to meet LDR results.                                                                               |
|                               | Second source calibration verification standard (ICV)  | Once per five point initial Calibration - second source.                                               | All analytes within 5% of target value                                                                                                                     | Correct problem then repeat initial calibration                                                                              |
|                               | Continuing calibration verification                    | Before sample analysis, after every 10 samples, and at the end of the analysis sequence -              | All calibration analytes within 10% of target value before sample analysis                                                                                 | Correct problem then repeat initial continuing calibration verification and re-analyze all samples since last successful CCV |
|                               | Method Blank                                           | Once per analytical batch                                                                              | No analytes detected > PQL                                                                                                                                 | Correct problem then re-prep and analyze method blank and all samples processed with that blank                              |
|                               | LCS/LCSD                                               | One per prep batch                                                                                     | See LIMS Test codes                                                                                                                                        | Re-prep and analyze the LCS/LCSD and all samples in that batch                                                               |
|                               | MS/MSD                                                 | One per prep batch                                                                                     | See LIMS Test codes                                                                                                                                        | None - Narrate the results in LIMS                                                                                           |
|                               | IDOC                                                   | Every time a new analyst performs the test method for the first time - second source.                  | See LIMS Test codes<br>LCS Accuracy for Limits                                                                                                             | Analyst cannot perform the test method until the IDOC passes method criteria                                                 |
|                               | LLOQ                                                   | Initial<br>Quarterly                                                                                   | Spike +35%, RSD <20%<br>Spike +35%, RSD <20%                                                                                                               | Re-evaluate, repeat study                                                                                                    |
|                               | MDL                                                    | Initial Blank & Spike MDL Study<br>Quarterly Verification. Annual MDL Study Re verification            | MDL < Spike Level<br>Analyte specific per test                                                                                                             | Re verification, repeat study                                                                                                |
| EPA 200.7 SW-6010D ICP Metals | Initial calibration (minimum 1 standards and a blank)  | Initial calibration prior to sample analysis                                                           | Not applicable                                                                                                                                             | Correct problem then repeat initial calibration.                                                                             |
|                               | CRI /LLICV/LLCCV                                       | Set to PQL                                                                                             | Result must be greater than calibration blank, <PQL<br>+30% for all analytes                                                                               | Correct problem the repeat initial calibration                                                                               |
|                               | Check Standard                                         | Calibration verification                                                                               | All analytes within 5% of target value                                                                                                                     | Correct problem, then reanalyze the calibration standard and check std.                                                      |
|                               | Second source calibration verification standard (ICV)  | Once per initial calibration - second source.                                                          | Mean value of all analytes within 5% of target value for 200.7 within 10% for 6010D                                                                        | Fix problem, repeat initial calibration                                                                                      |

| Method                              | QC Check                                                 | Frequency                                                                                       | Acceptance Criteria                                                                                                      | Corrective Action (3,4)                                                                                                                             |
|-------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| EPA 200.7<br>SW-6010D<br>ICP Metals | ICSA                                                     | Interference analytes Ca, Fe, Mg, Al<br>Beginning, end & periodic intervals                     | Concentrations of analytes<br>within 20% of target value                                                                 | Stop analysis; fix problem. Reanalyze<br>ICS; reanalyze all affected samples.                                                                       |
|                                     | ICSAB                                                    | Interference analytes Ca, Fe, Mg, Al<br>Beginning, end & periodic intervals                     | Concentrations of analytes<br>within 20% of target value                                                                 | Stop analysis; fix problem. Reanalyze<br>ICS; reanalyze all affected samples.                                                                       |
|                                     | Linear dynamic range                                     | Every six months                                                                                | All analytes within 10% of<br>target value.                                                                              | Calibration range adjusted to meet<br>calibration results.                                                                                          |
|                                     | Calibration blank                                        | After every calibration verification                                                            | No analytes detected within +/-<br>one MDL                                                                               | Correct problem then repeat initial<br>continuing calibration verification<br>and re-analyze all samples since<br>last successful calibration blank |
|                                     | Continuing calibration<br>verification (CCV)             | Before sample analysis, after<br>every 10 samples, and at the<br>end of the analysis sequence - | Analytes within 10% of target<br>value for method 200.7,<br>within 10% for method 6010D                                  | Repeat calibration and re-analyze<br>all samples since last successful<br>calibration verification.                                                 |
|                                     | Method Blank                                             | Once per analytical batch                                                                       | No analytes detected within +/-<br>one MDL                                                                               | Correct problem then re-prep and<br>analyze method blank and all samples<br>processed with the contaminated blank                                   |
|                                     | Duplicate                                                | One per batch<br>Sample concentration must be<br>4X MDL or greater for valid results            | %RSD must be 20% for water<br>%RSD must be 30% for soil                                                                  | Reanalyze duplicate sample.<br>Check system, re-prep, re-analyze<br>as needed                                                                       |
|                                     | LCS/LCSD                                                 | One per prep batch                                                                              | 200.7: within 15% of target<br>6010D: within 20% of target                                                               | Re-prep and analyze the LCS/LCSD<br>and all samples in that batch                                                                                   |
|                                     | Dilution test: 1:4 dilution                              | Each preparatory batch<br>Sample concentration must be<br>20X MDL                               | Five times dilution sample result<br>must be within 20% of the<br>undiluted sample result for<br>6010D and 10% for 200.7 | Perform post digestion spike<br>addition                                                                                                            |
|                                     | Recovery Test                                            | When dilution test fails or<br>sample concentration < 20X MDL                                   | Recovery within 25% of target<br>value                                                                                   | Perform method of standard<br>additions                                                                                                             |
| EPA 200.8<br>SW-6020 B<br>Metals    | MS/MSD                                                   | One per prep batch                                                                              | All analytes within 20% RPD<br>MS- (200.7 70-130%)<br>(6010D 75-125%)<br>PDS-(200.7 85-115%)<br>(6010D 80-120%)          | Check system, re-prep, re-analyze<br>as needed<br>Sample Conc. > 10X spike Conc., if<br>not, cannot validate MS                                     |
|                                     | IDOC                                                     | Every time a new analyst<br>performs the test method<br>for the first time - second source.     | See LIMS Test code or QC Charts<br>LCS Accuracy for Limits                                                               | Analyst cannot perform the test<br>method until the IDOC passes<br>method criteria                                                                  |
|                                     | LLOQ                                                     | Initial<br>Quarterly                                                                            | Spike +35%, RSD <20%<br>Spike +35%, RSD <20%                                                                             | Re-evaluate, repeat study                                                                                                                           |
|                                     | MDL                                                      | Initial Blank & Spike MDL Study<br>Quarterly Verification. Annual<br>MDL Study Re verification  | MDL < Spike Level<br>Analyte specific per test                                                                           | Re verification, repeat study                                                                                                                       |
|                                     | Initial calibration (minimum<br>1 standards and a blank) | Initial calibration prior to sample<br>analysis                                                 | Not applicable                                                                                                           | Correct problem then repeat initial<br>calibration.                                                                                                 |
|                                     | CRI /LLICV/LLCCV                                         | Set to PQL                                                                                      | Result must be greater than<br>calibration blank, <PQL<br>+30% for all analytes                                          | Correct problem the repeat initial<br>calibration                                                                                                   |
|                                     | Check Standard                                           | Calibration verification                                                                        | All analytes within 5% of<br>target value                                                                                | Correct problem, then reanalyze the<br>calibration standard and check std.                                                                          |
|                                     | Second source calibration<br>verification standard (ICV) | Once per initial calibration -<br>second source.                                                | Mean value of all analytes within<br>5% of target value for 200.8<br>within 10% for 6020B                                | Correct problem then repeat initial<br>calibration                                                                                                  |
|                                     | ICSA                                                     | Interference analytes Ca, Fe, Mg, Al                                                            | Concentrations of analytes                                                                                               | Terminate analysis; correct problem                                                                                                                 |

| Method                     | QC Check                                              | Frequency                                                                                                   | Acceptance Criteria                                                                                                   | Corrective Action (3,4)                                                                                                                    |
|----------------------------|-------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
|                            |                                                       | Beginning, end & periodic intervals (every 12 hours)                                                        | within 20% of target value                                                                                            | reanalyze ICS; reanalyze all affected samples.                                                                                             |
|                            | Linear dynamic range                                  | Every six months                                                                                            | All analytes within 10% of target value.                                                                              | Calibration range adjusted to meet calibration results.                                                                                    |
| EPA 200.8 SW-6020 B Metals | Calibration blank                                     | After every calibration verification                                                                        | No analytes detected within +/- one MDL                                                                               | Correct problem then repeat initial continuing calibration verification and re-analyze all samples since last successful calibration blank |
|                            | Continuing calibration verification (CCV)             | Before sample analysis, after every 10 samples, and at the end of the analysis sequence -                   | Analytes within 10% of target value for method 200.8, within 10% for method 6020B                                     | Repeat calibration and re-analyze all samples since last successful calibration verification.                                              |
|                            | Method Blank                                          | Once per analytical batch                                                                                   | No analytes detected within +/- one MDL                                                                               | Correct problem then re-prep and analyze method blank and all samples processed with the contaminated blank                                |
|                            | Duplicate                                             | One per batch<br>Sample concentration must be 4X MDL or greater for valid results.                          | %RSD must be 20% for water<br>%RSD must be 30% for soil                                                               | Reanalyze duplicate sample.<br>Check system, re-prep, re-analyze as needed                                                                 |
|                            | LCS/LCSD                                              | One per prep batch                                                                                          | 200.8: within 15% of target<br>6020B: within 20% of target                                                            | Re-prep and analyze the LCS/LCSD and all samples in the affected analytical batch                                                          |
|                            | Dilution test: 1:4 dilution                           | Each preparatory batch<br>Sample concentration must be 20X MDL                                              | Five times dilution sample result must be within 10% of the undiluted sample result for 6020 B or A and 10% for 200.8 | Perform post digestion spike addition                                                                                                      |
|                            | Recovery Test                                         | When dilution test fails or sample concentration < 20X MDL                                                  | Recovery within 25% of target value                                                                                   | Perform method of standard additions                                                                                                       |
|                            | MS/MSD                                                | One per prep batch                                                                                          | All analytes within 20% RPD<br>MS/MSD-200.8: 70-130%<br>MS/MSD-6020B: 75-125%<br>PDS-6020B: 75-125%                   | Check system, re-prep, re-analyze as needed<br>Sample Conc. > 10X spike Conc., if Not, cannot validate MS                                  |
|                            | IDOC                                                  | Every time a new analyst performs the test method for the first time - second source.                       | See LIMS Test code or QC Charts<br>LCS Accuracy for Limits                                                            | Analyst cannot perform the test method until the IDOC passes method criteria                                                               |
|                            | LLOQ                                                  | Initial<br>Quarterly                                                                                        | Spike +35%, RSD <20%<br>Spike +35%, RSD <20%                                                                          | Re-evaluate, repeat study                                                                                                                  |
|                            | MDL                                                   | Initial Blank & Spike MDL Study<br>Quarterly Verification. Annual MDL Study Re verification                 | MDL < Spike Level<br>Analyte specific per test                                                                        | Re verification, repeat study                                                                                                              |
| EPA 608.3 Pest/PCB         | Minimum 3-point initial calibration for all analytes  | Initial calibration prior to sample analysis                                                                | RF = 20%; Linear - least squares regression $r > 0.995$                                                               | Correct problem then repeat initial calibration                                                                                            |
|                            | Second source calibration verification standard (ICV) | Once per five point initial calibration - from second source                                                | All analytes within 20% of target value                                                                               | Correct problem then repeat initial calibration                                                                                            |
|                            | Retention time window calculated for each analyte     | Each day test is performed.                                                                                 | 3 times standard deviation for ea. analyte RT from 72 hour study                                                      | Fix problem then reanalyze samples analyzed since retention time check                                                                     |
|                            | Continuing calibration verification                   | Before sample analysis, after every 20 injections, at the end of analysis sequence - varying concentrations |                                                                                                                       | Fix problem. Repeat initial continuing calibration verification; reanalyze all samples since last successful CCV                           |
|                            | Breakdown check (Endrin and DDT)(1)                   | Daily prior to analysis of samples                                                                          | Degradation <20%                                                                                                      | Inlet column maintenance; repeat breakdown check                                                                                           |
|                            | Method Blank                                          | Once per analytical batch                                                                                   | No analytes detected > PQL                                                                                            | Correct problem, re-prep and analyze method blank & all samples processed with the contaminated blank.                                     |



| Method                                                                                                                                                                                                                                                                                                      | QC Check                                                                | Frequency                                                                                                     | Acceptance Criteria                                                       | Corrective Action (3,4)                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                             | LCS/LCSD                                                                | One per prep batch                                                                                            | All analytes within range of method criteria (SOPs/Methods)               | Re-prep and analyze the LCS/LCSD and all samples in the affected batch.                                                      |
| EPA 608.3<br>Pest/PCB                                                                                                                                                                                                                                                                                       | Surrogate Spike                                                         | Every sample, spiked sample, standard, and method blank                                                       | All analytes within range of method criteria (SOPs/Methods)               | Check system, re-inject, re-extract                                                                                          |
|                                                                                                                                                                                                                                                                                                             | MS/MSD                                                                  | Every batch                                                                                                   | All analytes within range of method criteria (SOPs/Methods)               | None - Narrate the results in LIMS                                                                                           |
|                                                                                                                                                                                                                                                                                                             | IDOC                                                                    | Every time a new analyst performs the test method for the first time - second source.                         | All analytes within range of method criteria (SOPs/Methods)               | Analyst cannot perform the test method until the IDOC passes method criteria                                                 |
|                                                                                                                                                                                                                                                                                                             | MDL                                                                     | Initial Blank & Spike MDL Study Quarterly Verification. Annual MDL Study Re verification                      | MDL < Spike Level<br>Analyte specific per test                            | Re verification, repeat study                                                                                                |
|                                                                                                                                                                                                                                                                                                             | Second column confirmation (2)                                          | 100% for all positive results                                                                                 | Same results as primary column analysis                                   | Only report the results that match. Use the highest results                                                                  |
| SM2540C<br>TDS<br>SM2540D<br>TSS                                                                                                                                                                                                                                                                            | Verification standard<br>Single standard<br>(if available)              | Each batch                                                                                                    | All analytes within 10% of target value<br>Flashpoint result 77-82°F      | Repeat test. If results are still not within 10%, report result and narrate in LIMS.                                         |
| SM2540B<br>T. Residue<br>EPA-160.4<br>VS                                                                                                                                                                                                                                                                    | Method Blank                                                            | Once per analytical batch                                                                                     | No analytes detected > PQL                                                | Correct problem, re-prep and analyze method blank and samples processed with the contaminated blank.                         |
| SM2540F<br>Sett Solids<br>SM-2540E<br>SW-1010A<br>Flashpoint                                                                                                                                                                                                                                                | Duplicate                                                               | One per batch<br>Sample concentration must be 2X MDL or greater for valid results.                            | %RSD must be 20% for water and 30% for soil.                              | Reanalyze duplicate sample. If results not within RSD limits, report QC failure in LIMS or flag as non-homogenous for soils. |
| SW1030<br>Ignitability<br>EPA-350.1                                                                                                                                                                                                                                                                         | IDOC                                                                    | Every time a new analyst performs the test method for the first time - second source.                         | See LIMS Test code or QC Charts<br>LCS Accuracy for Limits                | Analyst cannot perform the test method until the IDOC passes method criteria                                                 |
| Ammonia<br>EPA-351.2<br>TKN<br>EPA-353.2<br>NO3/NO2<br>NECi-07-0003<br>NO3/NO2<br>EPA-365.1                                                                                                                                                                                                                 | Five-point initial calibration for all analytes<br>(Excludes BOD, CBOD) | Initial calibration prior to sample analysis                                                                  | RF = 10%<br>Linear - least squares regression<br>r>0.99; ≥0.995 for 9056A | Correct problem then repeat initial calibration                                                                              |
| Phosphorus<br>Sulfate<br>SM4500S2F-2011<br>SW-9034<br>Sulfide<br>SM4500SO3B-2011<br>Sulfite<br>EPA-410.4<br>COD<br>SM5310B<br>SW-9060A<br>TOC<br>EPA-420.1<br>EPA-420.4<br>SW-9065<br>Phenolics<br>SM5540C<br>MBAS<br>EPA-300.0<br>SW-9056A<br>IC<br>Oil & Grease<br>SW-9071B<br>SW-1664B<br>SM5210B<br>BOD | Second source calibration verification standard (ICV)                   | Once per five point initial calibration - from second source.                                                 | All analytes within 10% of target value                                   | Correct problem then repeat initial calibration                                                                              |
|                                                                                                                                                                                                                                                                                                             | Continuing calibration verification                                     | Before sample analysis, after every 10 samples, and at the end the analysis sequence - varying concentrations | All analytes within 10% of target value                                   | Correct problem then repeat initial continuing calibration verification and re-analyze all samples since last successful CCV |
|                                                                                                                                                                                                                                                                                                             | Method Blank                                                            | Once per analytical batch                                                                                     | No analytes detected > PQL                                                | Correct problem then re-prep and analyze method blank and all samples processed with the contaminated blank.                 |
|                                                                                                                                                                                                                                                                                                             | LCS/LCSD                                                                | One per prep batch                                                                                            | See LIMS Test codes                                                       | Re-prep and analyze the LCS/LCSD and all samples in the affected analytical batch                                            |
|                                                                                                                                                                                                                                                                                                             | MS/MSD                                                                  | Every 10 samples (9038)<br>One per prep batch (remainder)                                                     | See LIMS Test codes                                                       | None - Narrate the results in LIMS                                                                                           |
|                                                                                                                                                                                                                                                                                                             | IDOC                                                                    | Every time a new analyst performs the test method for the first time - second source.                         | See LIMS Test codes<br>LCS Accuracy for Limits                            | Analyst cannot perform the test method until the IDOC passes method criteria                                                 |
|                                                                                                                                                                                                                                                                                                             | LLOQ                                                                    | Initial                                                                                                       | Spike +35%, RSD <20%                                                      |                                                                                                                              |

| Method                              | QC Check                                                | Frequency                                                                                      | Acceptance Criteria                                          | Corrective Action (3,4)                                                                                                           |
|-------------------------------------|---------------------------------------------------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| SM5210B<br>CBOD                     |                                                         | Quarterly                                                                                      | Spike +35%, RSD <20%                                         | Re-evaluate, repeat study                                                                                                         |
|                                     | MDL<br>(Excludes BOD, CBOD)                             | Initial Blank & Spike MDL Study<br>Quarterly Verification. Annual<br>MDL Study Re verification | MDL < Spike Level<br>Analyte specific per test               | Re verification, repeat study                                                                                                     |
| SM2310B<br>Acidity                  | Verification standard<br>Single standard (if available) | Each batch                                                                                     | All analytes within 10% of<br>target value                   | Repeat test. If results are still not within<br>10%, report result; narrate in LIMS                                               |
| SM2320B<br>Alkalinity               | Method Blank                                            | Once per analytical batch                                                                      | No analytes detected > PQL                                   | Correct problem, re-prepare and analyze<br>method blank and samples processed<br>with the contaminated blank.                     |
| Wastewater<br>Coliforms             | Duplicate                                               | One per batch                                                                                  | %RSD must be 20% for water<br>and 30% for soil.              | Reanalyze duplicate sample. If results not<br>within RSD limits, report QC failure in LIMS<br>or flag as non-homogenous for soils |
| SM9222D<br>F. Coliform              |                                                         | Sample concentration must be<br>2X MDL or greater for valid results.                           |                                                              |                                                                                                                                   |
| SM9222B<br>T. Coliform              | IDOC                                                    | Every time a new analyst<br>performs the test method<br>for the first time - second source.    | See LIMS Test code or QC Charts<br>LCS Accuracy for Limits   | Analyst cannot perform the test<br>method until the IDOC passes<br>method criteria                                                |
|                                     | Method Blank                                            | Once per analytical batch                                                                      | No analytes detected > PQL                                   | If method blank is contaminated,<br>reanalyze duplicate sample.                                                                   |
| Drinking Water<br>Coliforms         | Duplicate                                               | If available                                                                                   |                                                              |                                                                                                                                   |
| F. Coliform<br>SM9223               |                                                         |                                                                                                |                                                              |                                                                                                                                   |
| T. Coliform<br>SM9221D              | IDOC                                                    | Every time a new analyst<br>performs the test method<br>for the first time - second source.    |                                                              | Analyst cannot perform the test<br>method until the IDOC passes<br>method criteria.                                               |
| EPA-120.1<br>Conductivity           | Method Blank                                            | Once per analytical batch                                                                      | No analytes detected > PQL                                   | Correct problem then re-prepare and<br>analyze method blank and all samples<br>processed with the contaminated blank.             |
| Color<br>SM2120F<br>SM2120B         | Single Standard                                         | Once per analytical batch                                                                      | All analytes within 10% of<br>target value                   | Correct problem then repeat initial<br>calibration                                                                                |
| SM4500H+B-2011<br>pH                |                                                         |                                                                                                | Conductance and color standard<br>within 5% of target value. |                                                                                                                                   |
| EPA-180.1<br>Turbidity              |                                                         |                                                                                                |                                                              |                                                                                                                                   |
| SM4500CIG-2011<br>Residual Chlorine |                                                         |                                                                                                |                                                              |                                                                                                                                   |
| SW-9095B<br>Paint Filter            | Duplicate                                               | One per batch                                                                                  | %RSD must be 20%                                             | Reanalyze duplicate sample. If results<br>not within RSD limits, report QC                                                        |
| SM4500OH-2016<br>DO                 |                                                         |                                                                                                | pH Duplicates <0.1 pH Units                                  | failure in LIMS                                                                                                                   |
| SW-1311<br>TCLP                     | Method Blank                                            | Once per analytical batch                                                                      | No analytes detected > PQL                                   | Correct problem then re-prepare and<br>analyze method blank and all samples<br>processed with the contaminated<br>blank.          |
| SW-1312<br>SPLP                     |                                                         |                                                                                                |                                                              |                                                                                                                                   |
|                                     | Post extraction duplicate                               | One per batch                                                                                  | %RSD must be 20%                                             | Reanalyze duplicate sample. If results<br>not within RSD limits, report QC                                                        |
|                                     |                                                         |                                                                                                |                                                              | failure in LIMS                                                                                                                   |
|                                     | Post extraction spike                                   | Once per analytical batch                                                                      | See individual test methods.                                 | See individual test methods.                                                                                                      |

1. Endrin/DDT breakdown check for 8081B only.

2. Excludes chlordane, toxaphene, and PCB.

3. Sample data associated with QC non-conformances resulting in high bias may be reported if all target analytes are below reporting limits.

4. In the event that reanalysis is not possible, i.e. no remaining sample, holding times expired, etc., data may be reported with non-Conformance and its potential effect on the data described in a Case Narrative.

## 6.0 SAMPLE BOTTLE AND PRESERVATIVE PREPARATION

- 6.1 EETSE Atlanta does not provide sampling services, therefore, has no sampling plan or procedures. If requested by the client, EETSE Atlanta does provide appropriate pre-cleaned sample containers. The laboratory assumes responsibility for supplying the proper containers and preservatives.
- 6.2 Sample Container Preparation: [Table 3-3 within EETSE Atlanta SOP SR-09002 Sample Receiving](#) contains information for the correct containers needed for each analysis.
  - 6.2.1 A laboratory label and proper preservative are added to the sample bottle prior to shipment or pick-up by the client. Some clients may request several cases of bottles, preservative in separate containers, and separate labels. Should this occur, the client would be responsible for label attachment and the addition of preservatives in the field. If the client performs these duties, this is indicated on the bottle label and the chain of custody.
  - 6.2.2 If contamination is observed in trip blanks, a representative from each “lot” of sample containers may be analyzed for the detected parameter(s) to ascertain the cause.
  - 6.2.3 Bottle contamination checks are typically accomplished by filling the bottle with DI water and analyzing for the analytes in question. If any results are above the reporting level, contamination is present and the source must be found.
    - 6.2.3.1 A typical method of laboratory contamination is the introduction of volatile compounds into VOC vials by the use of extraction chemicals such as methylene chloride. Another means of laboratory contamination is the cross contamination of analytes into reagent bottles through poor analytical techniques. An example would be returning aliquots of reagents to their original containers after use. In this instance, contaminants in the reagents are measured as part of the sample result when the reagent is used in the test. Finally, cross contamination can occur during analysis when glassware that is used for the test is not been properly cleaned between samples.
    - 6.2.3.2 If the analysis indicates that the contamination source is the bottle manufacturer, the vendor or manufacturer must be informed immediately. Use of the affected bottles must stop immediately and another lot of bottles used instead.
    - 6.2.3.3 Methods of eliminating sample contamination are discussed in the individual analyte SOPs.
    - 6.2.3.4 [Procedures for checking sample bottles for sterility and metals contamination are outlined in the Sample Receiving SOP \(Sec. 3.2\).](#)
- 6.3 When the addition of preservatives is performed by laboratory personnel, the preservation type and amount used is marked on the label. This procedure informs the sample collection agent that the sample bottle has pre-measured preservative in it. Additionally, it provides important safety information for the sample collection agent.
- 6.4 Preservatives prepared by the laboratory are documented in a Preparation Standard logbook. The logbook contains the preservative preparation information including the preservative lot number and if the chemical was used “as is” from the manufacturer or if it was prepared in the lab. See Sec. 6.7.
- 6.5 Proper packing of bottles is essential to prevent breakage during shipping. All bottles should be wrapped in bubble wrap and the container, usually a cooler, filled with packing material.
- 6.6 Certain biological analyses require a sterile bottle for sampling. This includes plate counts, E-coli, and Total Coliform analyses. The laboratory purchases sterilized bottles for these analyses. Never break the seal on these bottles or open them as this can contaminate the bottles.

## 6.7 Preservatives and removal of interferences.

6.7.1 There are several preservatives used to increase the holding time for an analysis. In most cases, these preservatives are required by the test method, and are added to alter the sample pH or to remove possible interferences. The preservatives used at EETSE Atlanta include the following:

6.7.1.1 HCl: 1:1 Hydrochloric Acid (2 ml per liter of sample) is added to VOC vials and other sample bottles to lower the resultant pH to  $\leq 2$  after the addition of sample to the bottle.

6.7.1.2 H<sub>2</sub>SO<sub>4</sub>: Concentrated Sulfuric Acid (2 ml per liter of sample) is added to sample bottles to lower the resultant pH to  $\leq 2$  after the addition of sample to the bottle.

6.7.1.3 NaOH: Solid Sodium Hydroxide pellets are added to sample bottles to raise the resultant pH to  $\geq 12$  after the addition of sample to the bottle.

6.7.1.4 HNO<sub>3</sub>: Two ml per liter of sample of a 1:1 Nitric Acid (1 part concentrated Nitric Acid mixed with 1 part DI water) is added to sample bottles to lower the resultant pH to  $\leq 2$  after the addition of sample to the bottle.

6.7.2 Low results can be expected when analyzing for BOD, Volatile Organics, and Pesticides in the presence of chlorine. These samples must be tested for the presence of chlorine. This procedure is performed by placing a sample drop on a starch-potassium iodide paper strip. If the strip turns blue, chlorine is present and treatment is needed. Chlorine removal is accomplished through the addition of sodium thiosulfate (usually 2 – 4 ml of a 0.008% or a 1 N solution). Following the addition of this compound, the destruction of chlorine is verified through a subsequent chlorine check.

6.7.3 Low results can also be expected when analyzing for BOD in the presence of cyanides. Testing for the presence of cyanide is performed by placing a drop of sample on a lead acetate paper strip. If the strip turns black, cyanide is present and treatment is needed. Cyanide removal is accomplished through the addition of ascorbic acid, a few grains at a time, until the paper does not turn black. A few more grains can be added to the sample to ensure cyanide removal.

## 6.8 Bottle Kit Preparation

6.8.1 Number of bottles required per test, type of preservatives, and bottle type are method specific.

6.8.2 [Table 3-3 within EETSE Atlanta SOP SR-09002 Sample Receiving](#) indicates the preservation, holding times, and containers required for the types of tests and matrices analyzed in the laboratory.

## 7.0 CUSTODY OF SAMPLES, EQUIPMENT, AND SUPPLIES

### 7.1 Review of New Work

7.1.1 The Laboratory Manager is primarily responsible for determining the capacity of the facility and its resources to handle new work, although other senior members of management may be called upon to provide expertise and input as needed. This determination consists of a comprehensive appraisal of the client's projected needs. Factors assessed are the ability of the laboratory to comply with the requirements of its accreditations while maintaining the expected level of legal defensibility and analytical validity of all reported data.

7.1.2 Prior to the acceptance of any new requests, tenders, or contracts by EETSE Atlanta the appropriateness of facilities and resources is considered utilizing the information in the following sections. If the facility and/or resources are inadequate to perform the work, the Laboratory Manager may exercise his discretion to refuse to perform all or part of a particular project. The Executive Director of Customer Service will be informed of this decision and the Project Managers will inform the client. The laboratory affords clients cooperation to clarify requests and to monitor the

laboratory's performance in relation to the work performed (while ensuring confidentiality to other clients). Differences between the request and the contract shall be resolved before laboratory activities commence.

7.1.2.1 Facilities. The facility must be suitable for the proper receipt and storage of the number and type of samples proposed to be accepted.

7.1.2.2 Resources.

7.1.2.2.1 Stipulated methods, sample preparations, final reports, data packages, and deliverables are reviewed to determine the availability of suitable instrumentation and personnel.

7.1.2.2.2 The laboratory must be capable of meeting all analytical requirements for the selected test methods. The specified requirements and methods must be adequately defined, documented, and understood.

7.1.2.2.3 The laboratory shall advise and obtain approval from the client before subcontracting work to another laboratory.

7.1.2.3 Contracts

7.1.2.3.1 The methods and procedures selected will meet the customer's requirements.

7.1.2.3.2 The lab informs the customer when requested method is inappropriate or out of date.

7.1.2.3.3 Any differences between the request or tender and the contract shall be resolved before laboratory activities commence.

7.1.2.3.4 Each contract shall be acceptable to both the laboratory and customer.

7.1.2.3.5 Deviations requested by the customer shall not impact the integrity of the laboratory or the validity of results.

7.1.2.3.6 The customer shall be informed of any deviation from the contract.

7.1.2.3.7 If a contract is amended after work has commenced, amendments shall be communicated to all affected parties.

7.1.2.3.8 The laboratory shall cooperate with customers in clarifying requests and monitoring the laboratory's performance in relation to the work performed.

7.1.2.4 Records of Reviews

7.1.2.4.1 Records of Reviews including changes shall be retained.

7.1.2.4.2 Records shall also be retained of pertinent discussions relating to customer's requirements or laboratory activities.

7.1.3 Technical and Management Capability

7.1.3.1 The review of capability must establish that the laboratory possesses the necessary physical personnel, information, and resources to perform the tests in question. Additionally, the laboratory personnel must have the skills and expertise required for performing these tests.

7.1.3.2 The laboratory shall have adequate personnel at all times during the performance of analytical testing to ensure that clients receive data which meets the terms and conditions of the work agreement.



7.1.3.3 The review may consider the results of previous work of a similar nature or, where new testing is being implemented, the results of inter-laboratory testing, trial tests, proficiency samples, MDL studies, etc.

### 7.1.4 Discrepancies

7.1.4.1 Any differences between the request or tender and the capability of the laboratory to fulfill the proposed work are resolved before any testing begins. (The Chain of Custody is used to verify discrepancies because it is a form of contract.)

7.1.4.2 Modifications are allowed upon consent of the client. Changes are documented in the contract prior to acceptance. Each contract shall be acceptable to both the laboratory and the client.

7.1.4.3 Problems encountered during any stage of reviewing the testing are addressed and resolved to the satisfaction of both the laboratory and the client.

### 7.1.5 Records

7.1.5.1 The laboratory maintains any records for the initial review of new work entering the laboratory, including any significant changes in the proposed work plan.

7.1.5.2 Communication logs (telephone calls, on-site visits, meetings, e-mails, etc.) are used to record all pertinent discussions concerning the client's requirements. Logs must include the date, time, brief details of the exchange, resolution of any complaints, and identification of the parties involved.

7.1.5.3 Subcontracted work is described and documented prior to receipt of work from the client.

7.1.6 Once work has been accepted, the Director of Project Management is responsible for setting up the client in the LIMS system, setting up an account with the client, and monitoring the project to ensure that all of the client's requirements are met.

## 7.2 Sample Receipt

7.2.1 The laboratory has defined protocols for receiving samples and for the "logging in" process. These protocols provide information to the analysts regarding requested analyses, holding times, types of preservation, matrices, etc.

7.2.2 Sample Acceptance Policy - The laboratory will accept or reject samples for analytical testing based on presence, absence, or resolution of the required criteria specified for labeling, preservation, documentation, identification, hold time, container type, or volume. If this information is missing or comes into question, a corrective action report will be started to address any nonconformances. Upon completion of the corrective action, it will be determined if the laboratory accepts the samples. Samples will be considered accepted upon final login review. Unaccepted samples will be noted in the project narrative if other samples received meet the requirements.

7.2.2.1 The lab sample acceptance policy outlines circumstances under which sample are accepted and rejected. This policy is available to sample collection personnel and includes the following:

7.2.2.1.1 Documentation shall include sample identification, the location, date and time of collection, collector's name, preservation type, sample type and any comments concerning the samples.

7.2.2.1.2 Client samples should be properly labeled with unique identification. Indelible ink should be used along with water resistant labels.



- 7.2.2.1.3 Sample containers should be suitable for the requested test and the analysis hold time must be adhered to. (See [Table 3-3 within EETSE Atlanta SOP SR-09002 Sample Receiving](#) for Preservation, Hold Time, and Containers required.)
- 7.2.2.1.4 Sufficient sample volume must be available for the requested tests. If the client does not provide enough sample for all the tests, it will be noted on the sample receipt checklist. The project manager will contact the client to determine which tests the lab is to perform on the sample and whether or not the client will provide additional sample for other tests.
- 7.2.2.1.5 If samples show signs of damage, contamination or inadequate preservation, or any other concern, a corrective action must be initiated to determine if samples are acceptable for the requested analysis. Project managers with the assistance of the Director of Project Management, Technical Director, Quality Assurance Manager, or the Laboratory Manager address and close the corrective action by either accepting or rejecting the samples. (Corrective Actions and Nonconformances section 13.0) [Data that does not meet the requirements will be qualified by a statement in the report narrative.](#)
- 7.2.3 Upon receipt, each sample is identified by a laboratory-issued project number and a unique individual sample number. Properly followed, the preceding procedures provide court defensible documentation related to sample release to the lab, proper preservation and handling, and traceability throughout the analytical and reporting process.
- 7.2.4 Samples usually arrive at the laboratory in one of three ways: 1) delivered by carrier (UPS, Federal Express, and Mail), 2) delivered by courier, or 3) delivered by client personnel. In all cases, a document called a “Chain of Custody” (COC) must accompany the samples. This document, supplied by the laboratory to clients, is designed to provide to the laboratory all the necessary information about the client, samples, and which analyses are required. In addition, this document provides evidentiary information indicating who had samples in their possession at any time and when possession was changed. In some instances, the client provides their own chain of custody.
- 7.2.5 Once samples have been relinquished to the laboratory, they are checked for condition including the type(s) of preservation employed (temperature, pH, etc.), correctness of containers, and if the COC has been properly completed and signed.
  - 7.2.5.1 Almost all soil and water matrix samples require a transport temperature of ( $0 - \leq 6^{\circ}\text{C}$ .) The samples should be packed in ice in a thermal container. Typically, an insulated ice cooler is used for sample transportation. The cooler should have a temperature blank included for use as a sample temperature check. The temperature blank is a plastic bottle filled with water.
    - 7.2.5.1.1 Temperature is measured with a calibrated thermometer. The thermometer is individually identified and labeled with its calibration expiration date. The temperature of the blank must always be recorded during the login procedure. If the temperature is outside the  $0 - \leq 6^{\circ}\text{C}$  range, this should be annotated so that the project managers can notify the client.
    - 7.2.5.1.2 Samples that are hand-delivered to the laboratory immediately after collection may not meet these temperature criteria. In these cases, the samples shall be considered acceptable there is evidence that the chilling process has begun (such as arrival on ice).
    - 7.2.5.2 Before placement in the storage area, samples must be checked for integrity. If any bottles are broken or have leaked, the client must immediately be contacted. This is particularly important if there are no duplicates of the sample in order to obtain instructions from the client on how to handle the situation. It may be necessary to re-sample for the incomplete tests.

- 7.2.5.3 Sample labels are checked against the Chain of Custody for accuracy and discrepancies. Custody seals must be intact if used. This procedure is best accomplished by sorting samples by their location rather than by their testing requirements. For example, all samples labeled “MW-1A” are combined and may include VOCs, metals, SVOCs, etc. Make sure that all sample labels match the COC for number of analyses, sample ID, matrix, etc. If a discrepancy is found, the variance is noted on the Sample Receipt checklist and the client is contacted to clarify the problem.
- 7.2.5.4 Samples are checked for type and proper degree of preservation. This only applies to aqueous samples and never to volatile organic samples (VOC samples are checked after the vial has been opened and the sample analyzed). There are several types of preservation required for the different analyses. Most involve either a high or low pH.
- 7.2.5.4.1 To check the sample for pH, take a clean disposable Pasteur pipette and touch its tip to the top of the aqueous surface. Sample should be drawn by capillary action up the tube. Remove the pipette, recap the sample and touch the Pasteur pipette to some pH paper. Read the paper to the nearest pH unit.
- 7.2.5.4.2 Check the preservation chart (Section 6) to see if the pH is in the range required for the sample. If not, notify the Project Manager immediately. The Project Manager may require the addition of proper preservative to the sample. If the holding time is affected by inappropriate preservation, this should also be communicated to the client and analysts through the Project Manager.
- 7.2.5.5 Samples are checked for holding time. Holding times begin the moment the sample is taken, not when it is received. While most analyses have a holding time of several days, holding times vary widely from as little as 15 minutes to as long as 6 months. The time involved in shipment of a sample to the laboratory can greatly reduce the amount of time the analyst has to perform the procedure. It is therefore critical that holding times be noted accurately and the appropriate analyst or manager notified immediately if holding time is running out (less than 24 hours left).
- 7.2.5.6 Results of observations are noted on a “Sample Receipt Check List” at login. (See Procedures within EETSE Atlanta SOP SR-09002 Sample Receiving)
- 7.2.6 Samples are then placed in the sample holding area, either in the appropriate cooler or on the correct shelf. If the project requires a continuous Chain of Custody, they must be logged out of the area by the analyst and logged back in when analysis is completed using the logbook provided. If the sample is completely exhausted, this must be noted in the logbook.
- 7.2.7 Any deviations must be brought to the attention of the client and/or the Project Manager so the client may be contacted for directions on how to proceed. For example, some samples may be unsuitable for testing if the temperature has not been maintained.
- 7.2.8 After all sample information is logged into the computer, a printout of the entered data is made. A second individual must verify the accuracy of the sample information entered. If the log-in, COC, and all sample information are approved, the checking individual initials the work and the project folder is given to the Project Manager.
- 7.2.9 Occasionally, samples require special storage times after the analyses are complete. This should be noted when these samples arrive at the laboratory to avoid them being prematurely discarded. To apprise all affected personnel, annotate this information into LIMS. These samples are to be stored

in the special holding area designated by the Sample Receiving Department. A Project Manager will notify the Sample Receiving Department which samples are required to be placed in this area.

7.2.10 Sample bottles are segregated according to their required analyses. Samples analyzed for volatile organics are placed in a separate cooler/refrigerator from semi-volatile organics or inorganics **due to the possibility** of cross-contamination from inorganic and waste samples. Samples for metal analyses do not require cooling. These samples may be placed on the shelf at room temperature.

7.2.11 Once samples have been removed from a cooler, the cooler must be cleaned before reuse. Usually, rinsing and air drying of the cooler will be sufficient. Make sure to return clients' coolers.

## 7.3 Review of Sample Login

7.3.1 When samples (a project) arrive at the laboratory, a project is created in the laboratory information management system (LIMS) and reviewed by a project manager as discussed in the Section 7.3.3.

7.3.1.1 A "Review of Sample Login" report is filled out by the sample custodian and this report is turned in to the project manager. The project manager reviews the information to ensure that all analyses, sample IDs, etc. are correct.

7.3.1.2 If any problems were found, they are corrected. A copy of the problem and its resolution is transmitted to the Sample Receiving Manager.

## 7.3.2 Sample Receipt Checklist (SRCL)

7.3.2.1 The sample receipt checklist ([Appendix VII](#)) is a list of all information pertaining to the arrival of a project at the laboratory. If any problems are found, such as errors on the chain-of-custody (COC), or any situation does not comply with the procedure or method, such as problems with sample preservation or holding time, the project manager is notified immediately in order to contact the client. The following list represents the questions asked on the SRCL:

7.3.2.1.1 Was the shipping container/cooler in good condition?

7.3.2.1.2 If there were custody seals on the shipping container/cooler, were they intact?

7.3.2.1.3 If there were custody seals on the samples, were they intact?

7.3.2.1.4 Was the container/temperature blank in compliance?

7.3.2.1.5 Was the chain-of-custody present?

7.3.2.1.6 Was the chain-of-custody signed when relinquished and received?

7.3.2.1.7 Did the chain-of-custody agree with sample labels?

7.3.2.1.8 Were samples received in the appropriate containers to perform the requested analysis?  
If VOA vials were received, were all vials void of headspace?

7.3.2.1.9 Were all sample containers received intact?

7.3.2.1.10 Was sufficient sample volume received to perform requested analysis?

7.3.2.1.11 Were all samples received within the EPA recommended holding times and within the recommended temperature ranges?

7.3.2.1.12 Was turnaround time marked on the chain-of-custody?

7.3.2.1.13 If samples were submitted for volatiles analysis, did they have zero headspace?

7.3.2.1.14 Was the pH acceptable for water samples upon receipt?

7.3.2.1.15 Were samples in good condition?

7.3.2.1.16 Is a known blank included for diffusive samples or AIHA LAP lead analysis?

7.3.2.2 All information at the top of the SRCL, such as client name, date/time received, and carrier name, must also be checked for accuracy. All out-of-compliance and non-conforming events are documented on the SRCL as well as in the PM non-conformance corrective action in LIMS. The client is contacted to discuss the issue or conflict. Resolution, as agreed upon by the client, is documented in the PM corrective action in LIMS and SRCL. Either the Director of Project Management or the Laboratory Manager closes out all corrective actions.

7.3.2.3 In addition, for Drinking Water samples associated with Waster Suppliers, the following Sample Information will be documented for samples where applicable and when available.

7.3.2.1.1 Name of System (PWSS identification number if available)

7.3.2.1.2 Sample Identification (if any)

7.3.2.1.3 Sample Site location

7.3.2.1.4 Sample Type (e.g. routine, repeat, raw or process)

7.3.2.1.5 Date and Time of collection

7.3.2.1.6 Analysis required

7.3.2.1.7 Disinfectant Residual (if available)

7.3.2.1.8 Name of sampler and organization (if not water system)

7.3.2.1.9 Sampler's Initials

7.3.2.1.10 Person(s) transporting sample from system to laboratory  
 (If not sampler), if shipper used, shipping records available

7.3.2.1.11 Any remarks

7.3.3 Procedure for Creating and Reviewing Projects in LIMS  
 (See Procedures within EETSE Atlanta SOP SR-09002 Sample Receiving)

7.4 A Corrective Action Report is generated in LIMS for any sample receiving non-conformance. Section 13 of this Manual describes the Corrective Action Process in detail.

7.5 Health and Safety

7.5.1 All samples should be considered to be hazardous. Until a sample is analyzed, it is impossible to determine what type of contamination is involved. With this in mind, always wear the following safety equipment when handling samples.

7.5.1.1 Safety Glasses: OSHA approved safety glasses must be worn when working with samples. Safety glasses prevent an invasion of the sample into the eye and protect the eyes in case of a sample explosion.

7.5.1.2 Latex Gloves: Latex Gloves must be used when handling samples. Latex gloves protect the hands from the effects of corrosive materials, such as strong acids or bases. In addition, gloves prevent the introduction of hazardous materials into the body by absorption through the skin.

- 7.5.1.3 Sensible Clothing: Long pants and close-toed shoes (no sandals) must be worn at all times while working in the sample receiving area. Many of the samples received by the laboratory are 1 liter or greater in size. A liter of water weighs slightly more than 2 pounds. Dropping a liter of water on an unprotected toe from waist height can fracture the toe. Never wear any clothing that you are not afraid to ruin. Many of the preservatives used in the laboratory are acidic and will eat a hole in most natural materials. If the fiber is man-made, such as nylon, any strong solvent will melt it.
- 7.5.1.4 Lab Coat: Required when in the laboratory or handling samples or chemicals. Not only does it protect your clothing, but it also provides an additional cloth barrier against splashes and spills.

## 7.6 Sample Custody

- 7.6.1 EETSE Atlanta has implemented sample chain-of-custody procedures to provide accurate, verified, and traceable records of sample possession and handling, from sample container shipment through laboratory receipt and sample disposition.
- 7.6.2 Documentation of sample collection, shipment, laboratory receipt and custody is accomplished utilizing a chain-of-custody record. A sample is considered in custody if the following conditions have been met.
- 7.6.2.1 The sample(s) are in the physical possession of the sampler or courier.
- 7.6.2.2 The sample(s) are in view after being in the physical possession of the sampler or courier.
- 7.6.2.3 The cooler(s) or sample bottle(s) are sealed, so that sample integrity is maintained, while in the possession of the sampler or transferee.
- 7.6.2.4 The cooler(s) or sample bottle(s) are in a secured area restricted to authorized personnel.
- 7.6.3 Custody Record Maintenance
- 7.6.3.1 Laboratory records, including copies of the chain-of-custody forms and any associated documentation, are maintained in a secure area with any associated project records.
- 7.6.3.2 Laboratory data are recorded in bound notebooks and entries are made in waterproof ink.
- 7.6.3.3 Laboratory data entry errors are deleted with a single-line through the error. The correction is initialed and dated by the analytical staff member making the change.
- 7.6.3.3.1 Correction tape or other substances designed to obliterate documentation are strictly prohibited in the laboratory and custody areas.
- 7.6.3.4 Laboratory information is documented on prepared forms. All forms for recording laboratory data include a space for the date and for initials that must be completed by the data recorder. Laboratory documentation not recorded on pre-prepared forms is also dated and initialed.
- 7.6.4 The sample custodian, under either routine or special legal chain-of-custody procedures, receives all samples. Legal custody is a special type of sample custody in which all events associated with a specific sample are documented in writing.
- 7.6.5 Laboratory Provided Sample Containers
- 7.6.5.1 Sample containers provided by EETSE Atlanta are manufactured from EPA-designated materials, contain EPA-prescribed preservatives, and are affixed with an EETSE Atlanta identification label.



7.6.5.2 Pre-cleaned sample containers are purchased by EETSE Atlanta. When deemed necessary by the Technical Director, containers from each lot are pre-certified in house prior to use. A lot number is affixed to each container for purpose of traceability.

### 7.6.6 Chain of Custody Documentation, Traceability, and Sample Integrity

7.6.6.1 Formal chain-of-custody procedures are initiated by a sample custodian responsible for the organization and relinquishing of sample containers to the client or field personnel.

7.6.6.2 Properly record all fields of information on the chain-of-custody form. Proper completion of the form is the responsibility of the client's field sampling manager and is required prior to relinquishing the samples.

7.6.6.3 If the site location is different from the client address, the site location is recorded in the "Project Name" space on the chain-of-custody form, or on the right hand side of the form if additional space is required. The sample identifications assigned in the field are recorded in the "Sample Identification" column.

7.6.6.4 Common carriers may identify themselves by signing the "Relinquished By" space on the chain-of-custody form.

7.6.6.5 Maintain chain-of-custody for samples transported from the field to the laboratory by common carrier. Completed custody forms must accompany each sealed cooler by placing them in a plastic bag taped to the inside lid of the cooler.

7.6.6.6 Maintain a copy of each air bill package tracking form associated with a shipment of samples in the appropriate client files.

7.6.6.7 The custody-technician is responsible for the inspection of shipping containers upon laboratory receipt for overall integrity to ensure that the contents have not been altered or tampered with during transit. If tampering is apparent, the sample custodian immediately contacts the assigned project manager who is responsible for notifying the client.

7.6.6.7.1 The cooler inspection form, filed by the sample custodian, describes the deficiency and annotates any corrective action required by the client. Document any appropriate changes on the accompanying project chain-of-custody form, which is dated and signed by the sample custodian or project manager.

7.6.6.8 If shipping containers arrive intact, the sample custodian in the receiving area immediately opens them. The chain-of-custody form and temperature bottle are removed for inspection. Upon receipt, the container temperature is documented in a sample registry or, if requested by the client, documented on the chain-of-custody form.

### 7.7 Continuous Chains of Custody

7.7.1 A "Continuous Chain of Custody" sets protocols for keeping an unbroken, or continuous, chain of custody. The intent of this procedure is to enable EETSE Atlanta employees to track samples from the time and date of receipt to the time and date of disposal, particularly where legal cases are involved. In doing this, a constant record is kept of when and by whom samples are removed from the Sample Receiving Department. EETSE Atlanta will use its standard Chain of Custody (CoC) internally as a "Continuous Chain of Custody" if requested by a client.

7.7.2 Project Managers will notify the Sample Receiving Department when jobs require this unbroken Chain of Custody.



- 7.7.3 A sequential laboratory identification number is assigned to the project and recorded on the chain-of-custody form, on each sample container submitted with the project, and in the Laboratory Information Management System (LIMS).
  - 7.7.3.1 Accurate and complete sample documentation must be provided on the chain-of-custody form in order to log samples into LIMS. The information entered includes all information necessary to maintain chain-of-custody including laboratory ID, client (field) ID, and initials of the sample receipt custodian.
  - 7.7.3.2 Ancillary information, such as sample collection date and requested analyses, is also transferred directly from the chain-of-custody form into the LIMS and appears on the client project-specific acknowledgement.
- 7.7.4 Once the chain of custody is verified, the project is logged into the LIMS to transfer the desired work order request to the laboratory.
  - 7.7.4.1 The sample custodian checks the information on each sample's label against that on the chain-of-custody form for discrepancies.
  - 7.7.4.2 The sample custodian also inspects all samples for leakage or obvious seal (if provided) tampering. All samples are unpacked in a well-ventilated sample receipt area.
  - 7.7.4.3 Samples received in plastic containers, or those that appear to be accumulating or evolving gas, are treated cautiously and inspected under a chemical hood since they may contain toxic fumes or be of an explosive nature.
  - 7.7.4.4 A "Cooler Receipt Form" is completed to document custodial concerns at sample login.
- 7.7.5 Custody discrepancies noted by the sample custodian are transmitted to the project and sample manager and are resolved with the client prior to laboratory work assignment. Discrepancies are documented on the Anomaly Report.
  - 7.7.5.1 The Project Manager and the Sample Custodian attempt to resolve custody discrepancies expeditiously to avoid holding time compromises. After a decision concerning a sample has been made, the Project Manager or Sample Custodian makes an initialed note in the work order narrative. The person, who was notified, time, date, and resolution, if applicable, is documented. This information is also documented on the Sample Custody Excursion form.
  - 7.7.5.2 Email or hard copy of custodial resolutions or project order alterations is secured from the client prior to work initiation. Copies of this documentation are mailed to the client and maintained in the client file.
- 7.7.6 After addition of the project sequential identification number, the samples are distributed to the appropriate sample storage areas. Sample storage temperature logs are maintained for all sample storage refrigerators to assure proper temperature maintenance throughout the analytical process.
- 7.7.7 As soon as possible, all samples received by EETSE Atlanta are checked, by the appropriate preparation or analytical department, for proper pH adjustment. The pH of each sample is measured, documented, and adjusted if necessary. To avoid compromising sample integrity, volatile samples are checked for proper pH adjustment only at the time of analysis. The pH of volatile samples is not adjusted.
- 7.7.8 Only authorized personnel are permitted within the laboratory areas where sample access is possible. Sample storage areas are designed to segregate volatile and non-volatile samples. Standards and extracts are also departmentally controlled and stored separately.

- 7.7.9 The set of analyses required for a group of samples is project-dependent. After sample registry login and verification, samples are transferred from the receiving area to the appropriate sample preparation area. Those samples not requiring preparation are immediately sent to the sample analysis storage area. Using LIMS-generated sample preparation worksheets for guidance, samples are extracted, digested, or distilled as appropriate. The extracts, digestates, or distillates are then transferred to the appropriate analysis section, where analysis is performed.
- 7.7.10 For projects where the client requires in-laboratory custody records, the EETSE Atlanta project manager informs the sample custodian that they need to coordinate custody activities prior to sample receipt. For these samples, staff complete department-specific in-laboratory sample tracking forms. Samples and sample preparations are stored in approved sample storage areas.
- 7.7.11 Sample holding times are tracked via the LIMS. Sample collection dates are routinely entered into the LIMS with all sample logins. This information allows holding times specific to each departmental analysis to be tracked by department managers, supervisors, chemists, and analysts through the use of daily status sheets, reference sheets, and preparation worksheets.
- 7.7.11.1 Date analyzed is recorded via instrument outputs as an integral part of the raw data.
- 7.7.11.2 The date of analysis is entered into the LIMS and compared to the date sampled to validate that holding times were not compromised.
- 7.7.12 Upon completion of analytical work, custody of unused sample portions, extracts, or digests is relinquished to a central secured storage area. Here the samples, digests, or extracts await disposal, which is performed with assistance of the LIMS. The LIMS stores client specific disposal instructions, compiles results from the analyses of composite samples, prepares sample disposal lists, invoices for disposal and sample return costs, and provides a disposal record for all excess samples.
- 7.7.13 By careful assignment of user passwords and file access/lock codes, EETSE Atlanta maintains a high level of data security in the LIMS. Thus, only authorized EETSE Atlanta personnel can access client files to view data. In addition, data entry and editing is restricted to highly trained data management personnel.
- 7.7.13.1 Data may be downloaded in a variety of standard formats including ASCII, spreadsheet, database, and text files, such as \*.ASC, \*.WK1, \*.DBF, \*.TXT, etc.
- 7.7.13.2 Additionally, laboratory data may be formatted to match client-specific requirements. These requirements are defined and agreed upon prior to project commencement.
- 7.7.13.3 Laboratory data is thoroughly reviewed prior to preparation of electronic or disc deliverables. The download process includes electronic and logical error check routines to confirm that the data files delivered are consistent with the client's format and data content needs.
- 7.7.13.4 A signed digitally signed electronic report is provided with diskette deliverables and an electronic and documentation audit trail of each download event are maintained.

## 7.8 Data Security

- 7.8.1 Client information is confidential and should be protected during electronic storage and transmission of results. In order to ensure data integrity and security, all files selected for data downloads are transferred from the LIMS to an isolated PC computer system. Access to downloaded files is then controlled via required matches of employee log-on sequences and confidential passwords. The entire download process is regularly reviewed and maintained by the computer department for system performance.

- 7.8.2 The LIMS manager maintains internal documentation for all LIMS programs. This documentation includes descriptions of any program additions, deletions, or modifications, the dates of revisions, and the initials of the responsible programmer. To verify proper functioning of the program hardware and software, a simulation account is maintained. When hardware or software is modified, the LIMS uses actual data in the simulation account to verify that the modifications are functioning as anticipated. Anti-virus software serves as an additional protective measure.
- 7.8.3 Data is entered into the LIMS through direct instrument interfaces and manual entry of data from the chemists' worksheets. Immediately following data entry, approval sheets are printed with the entered data as it appears in the LIMS. Assistant project managers compare all data on the approval sheets against the chemists' worksheets for data transcription errors.
- 7.8.4 Data worksheets, data approval forms, and final reports are routinely printed for verification and signatures. Hard copies of final reports, field data, chain-of-custody forms, and any ancillary documentation pertinent to the project are kept in a secured storage area and placed chronologically within alphabetically arranged client files.
- 7.8.5 EETSE Atlanta maintains a security policy. Under this policy, all external doors are either visually monitored by EETSE Atlanta staff or kept locked. Visitors are required to sign in. They are accompanied at all times by an EETSE Atlanta staff member.
- 7.9 Container Receipt
  - 7.9.1 When the laboratory receives containers, they are entered into the Received Container Logbook. An EETSE Atlanta ID Container number unique to that case of containers is issued. Contamination is checked for in containers that do not include a Certificate of Quality Environmental Compliance.
  - 7.9.2 The following is a step-by-step guide for entering all information associated with the container:
    - 7.9.2.1 A unique EETSE Atlanta ID # is given to each box of containers. This number is given in numerical sequence by adding one to the previous number.
    - 7.9.2.2 Under "Container Description", enter a brief description of the bottle type. Include: bottle size, plastic or glass, clear or amber, preservatives, and pre-cleaned, if noted.
    - 7.9.2.3 Enter the date that the containers were received at the laboratory in the "Date Received" box.
    - 7.9.2.4 Under "Vendor Name", enter the name of the vendor that the containers were ordered from. The sample-receiving manager has this information.
    - 7.9.2.5 Enter the vendor lot number under the "Vendor Lot #" box. This number is found on a vendor provided label on the outside of each case of bottles.
    - 7.9.2.6 Under "Date Expires", enter the date that the containers will expire. This date will be one year after the containers were received at the laboratory, unless otherwise stated by the manufacturer.
    - 7.9.2.7 Enter the number of containers in each case under the "No. of Containers in Lot" box. This information is found on a vendor provided label on the outside of each case of bottles.
    - 7.9.2.8 A Certificate of Quality Environmental Compliance is found inside of each box of glass containers. This information is filed in the sample-receiving department. All plastic containers will be checked for contamination in each new lot that is received by the laboratory. The

EETSE Atlanta lab number will be written in the “Contamination check OK” box. The information for the contamination check will be found in the LIMS system.

7.9.2.9 Enter the initials of the person that received the containers in the “Initials” box.

7.9.2.10 After each case of containers has been properly entered into the Received Container Logbook, the EETSE Atlanta ID # and the expiration date should be written clearly on each case of containers in permanent ink. The containers should then be placed in the for use bottle storage area.

7.9.3 A logbook of records shall be kept in the sample-receiving department. It should be checked periodically by the sample receiving department manager to ensure that it is properly maintained.

### 7.10 Subcontracting to Other Laboratories (See Procedures within EETSE Atlanta SOP SR-09002 Sample Receiving)

#### 7.11 Purchasing Services and Supplies

##### 7.11.1 Procurement Document Control

Vendors of analytical supplies to EETSE Atlanta Inc. are regarded as a resource to and an extension of the laboratory. Standards for quality identified in this document shall be applicable to vendors.

7.11.2 The purpose of the procurement control document is to assure the quality and traceability of procured items (equipment, materials, or services) in instances in which the specifications could affect the quality of the services provided by EETSE Atlanta, Inc. This includes such quality related items as the calibration of instruments by outside laboratories, purchase of standards, subcontracted services, and materials requiring testing before use.

7.11.3 Control of purchased materials, equipment, and services is a system designed to insure products and services conform to the procurement requirements. This system includes provisions for vendor evaluation and selection, objective evidence of quality furnished by the vendor, and examination of products or services upon delivery. Prior to the use of such products and services, documented evidence of conformation to the procurement requirements must be provided. This evidence is maintained in the analytical department office records.

7.11.4 It is the responsibility of the Accounting Department to insure the development and implementation of procedures to control purchased products and services. It is the responsibility of the purchasing agent to specify quality objectives for procured items and services. Purchased materials that fail to meet established criteria are documented by Non-conformance reports issued by the purchaser.

##### 7.11.5 Procedures and Responsibilities

7.11.5.1 It is the responsibility of the purchasing agent to provide assurance, when required, that all applicable regulatory requirements, industry codes, and standards appear with the purchase documentation for the affected services and products.

7.11.5.2 The Purchasing Department retains Purchase Orders for control purposes.

7.11.5.3 Purchased items which do not meet the minimum standards set forth by the purchasing agent are processed according to procedures set forth in Section 13.0, “Corrective Action.”

7.11.5.4 The appropriate manager or supervisor and QA Manager review purchase orders to ensure that quality related services or products meet the criteria of the laboratory’s accreditations.

7.11.5.5 Purchase orders for standard catalog items do not require QA review unless they include thermometers, thermistors, hydrometers, pipettors, or analytical balance weights.

7.11.5.6 Where possible, reference materials (such as calibration standards) are purchased from a supplier that conforms to ISO Guide 34 in combination with ISO/IEC 17025, accreditation by an ILAC recognized signatory. External Calibration services shall, wherever possible, be obtained from providers accredited to ISO/IEC 17025 by an ILAC recognized signatory.

### 8.0 ANALYTICAL PROCEDURES

8.1 Method Sources and supporting procedures include the following:

- 8.1.1 Analytical methods used are currently accepted and approved by the US EPA, NIOSH, and “Standard Methods”.
- 8.1.2 Other reference procedures for non-routine analyses including methods stipulated by specific states, such as Underground Storage Tank methods, or by ASTM.
- 8.1.3 [Appendix X](#) includes the list of controlled outside reference documents maintained by EETSE Atlanta. Control and updating of the reference document is completed annually by the Technical Director. Electronic document updates or web links to current revisions are posted to the laboratory portal server library, and [Appendix X](#) is updated with the annual update to the QA Manual.
- 8.1.4 The laboratory has a procedure (for the AIHA LAP program) in the form of a Standard Operating Procedure (SOP) for the validation of methods in the event a laboratory designed method or a non-standard method is used.
- 8.1.5 Laboratory Standard Operating Procedures (SOPs) are located on the company’s intranet archival system, commonly referred to as the “portal server”. These procedures contain the description of the preparation, calibration, analysis and/or verification test procedures.

8.2 Document Control. This section describes the procedures for control and maintenance of documentation through a document control system, which ensures that standard operating procedures, manuals, and reference documents clearly indicate the time period during which the procedure or document was in force. Regardless of which analytical procedures are used in the laboratory, the methodology shall consist of carefully documented Standard Operating Procedures (SOPs) and approved methods which may be periodically modified, updated or replaced entirely due to advances in technology or changes in regulatory protocols. Some clients may require pre-approval of method revisions before modifications are used to generate data. Documentation of analytical procedures for generating laboratory data shall be clear, concise, adequately referenced, and reflect the actual steps employed by the analyst.

#### 8.2.1 Procedures

Methodologies employed in the laboratory are documented by the creation of an SOP. This document provides the analyst with the information necessary to perform the analysis. Every SOP is created in accordance with this QA document. It follows the intent of the method it is patterned after, but provides any additional information essential to the specific instrument instructions, specific quality concerns, etc.

- 8.2.1.1 If an SOP is not available for a specific analysis, the analyst will follow EPA, Standard Methods, NIOSH, or other regulatory methodology as required. Deviations are not allowed.
- 8.2.1.2 Before a new method is accepted for routine use, adequate performance must be demonstrated. This includes an MDL study, IDOC, and related QA/QC procedures as required by the method.



- 8.2.1.3 Appropriate management personnel evaluate the merits of all new methods and recommend approval or rejection based on the available data. This committee includes, at a minimum, the Laboratory Manager and Technical Director. If the method is approved, a Standard Operating Procedure is created and the procedure is implemented.
- 8.2.1.4 All analytical procedures must provide documentation so that the complete process used to produce data can be reconstructed.
- 8.2.1.5 All deviations from an approved analytical procedure are authorized and documented by the Technical Director.
- 8.2.2 Changes to an approved procedure require, at a minimum, an Interim Change Notice. A complete revision and re-issuance of the SOP may be required. SOPs are reviewed at least annually.
- 8.2.3 A list of all current SOPs including their review and revision status is maintained electronically on EETSE Atlanta\_server\L\Current SOP\SOP Masterlist. Current SOPs are maintained electronically on the EETSE Atlanta Portal Server in the Technical Management folder. All controlled documents are in "Read Only" format and password protected. The Business Unit Manager, Technical Director and their appointees are the only laboratory employees with edit access to these folders. In addition, a master list of controlled documents is maintained for documents other than SOPs. This includes various forms, software, references, etc. It is located at EETSE Atlanta\_server\L\Current SOP\Documents\_Master\_List\_Non-SOPs.
- 8.3. Instructions and Procedures  
It is the policy of EETSE Atlanta Inc. that all analyses and operations are performed using approved written procedures which are to be available to the personnel conducting the analysis /operation. The procedures assume one of two general formats. These formats are "Temporary Procedures" and "Standard Operating Procedures."
- 8.3.1 Temporary procedures are designed to accommodate the transition from a developing analytical service or method to an established procedure in the most efficient manner. They are less than formal procedures but are adequate to document the procedural treatment of samples. Effective dates and expiration dates are documented. Temporary Procedures, approved by a manager and the Technical Director, can be handwritten procedures and contain at a minimum the following information:
  - 8.3.1.1 Health and safety requirements to perform procedure (if necessary).
  - 8.3.1.2 Actual analytical method (step by step).
  - 8.3.1.3 Materials list (if necessary).
  - 8.3.1.4 Reagents (if necessary).
  - 8.3.1.5 Calculations needed to perform procedure.
  - 8.3.1.6 Reference sources from which procedure was developed.
- 8.3.2 Standard Operating Procedures (SOPs) are a formal treatment of an analytical or administrative procedure. Analytical SOPs shall be generated using nationally recognized procedures and incorporate EETSE Atlanta, Inc., operations and instrumentation. The SOPs are revised as required by the appropriate Managers and are reviewed and authorized for continued use at least annually. Analytical SOPs contain the following information:
  - 8.3.2.1 Title, issue date and revision number
  - 8.3.2.2 Approval signatures



8.3.2.4 Sample preparation, handling, storage and disposal

8.3.2.5 Definitions

8.3.2.6 Responsibilities

8.3.2.7 Hazards and safety requirements

8.3.2.8 Materials and equipment

8.3.2.9 Standardization and calibration requirements

8.3.2.10 QC sample frequency and performance criteria

8.3.2.11 Operating instructions

8.3.2.12 Example calculations and data sheets

8.3.2.13 References

8.3.3 Administrative Procedures contain the following sections

8.3.3.1 Contents Page

8.3.3.2 Purpose and scope paragraphs

8.3.3.3 Text

8.3.4 Emergency procedures are divided into three sections:

8.3.4.1 Symptoms

8.3.4.2 Immediate actions

8.3.4.3 Subsequent actions

8.3.5 Amendments of Documents by Hand:

8.3.5.1 SOPs are only amended via a permanent or temporary Interim Change Notice (ICN).

8.3.5.2 Spreadsheets, checklists, logbooks, and other documents that are templates which are filled in with data may be amended by a department manager, technical director, QA manager, or laboratory manager's approval. The manager/director should write the change on the document, then initial or sign and date the document.

8.4 Electronic Document Control

The laboratory SOPs are maintained electronically by the Technical Director through the electronic document control system. Hard copy signed originals of the procedures are Maintained by the Technical Director or appointee. Any staff member may request revision to the procedures.

8.5 Creating and Maintaining Standard Operating Procedures

"Standard Operating Procedures" describes the system for preparation, issue, implementation, and revision of formal Standard Operating Procedures for EETSE Atlanta Standard Operating Procedures are defined as written procedures for personnel to perform analyses, technical operations, tests, processes, administrative operations and tasks, or inspection of samples submitted to EETSE Atlanta.

8.5.1 Procedures are tracked, issued, revised, and filed.

## 8.6 Responsibilities

All technical and administrative staff is familiar with the requirements of this procedure and is responsible for its implementation. To ensure uniform and accurate procedures, the following personnel are assigned with the stated responsibilities:

### 8.6.1 SOP Author - The Author, when writing SOPs ensures the following:

- 8.6.1.1 The SOP meets applicable regulatory requirements.
- 8.6.1.2 The SOP includes the actual instruments and materials associated with EETSE Atlanta, Inc.
- 8.6.1.3 The SOP follows the requirements of the published standard method(s).
- 8.6.1.4 The SOP conforms to guidelines established in this document.
- 8.6.1.5 The SOP meets the applicable requirements of the laboratory's QA Manual.
- 8.6.1.6 That he responds to reviewer(s) comments in a timely manner.

### 8.6.2 Section Supervisor - The Section Leader is responsible for the following:

- 8.6.2.1 Review all new SOPs originating within their section.
- 8.6.2.2 Ensure the personnel in their department are aware of the SOP and understand their responsibility pertaining to the SOP.

### 8.6.3 Technical Director - The Technical Director is responsible for the following:

- 8.6.3.1 If a new SOP needs to be created, the Technical Director may assign the task of drafting SOPs to qualified individuals who possess the requisite experience and good communication/writing skills. The Technical Director may elect to write the SOP.
- 8.6.3.2 Ensures SOPs are in compliance with current regulations and established methods.
- 8.6.3.3 Reviews and approves all SOPs.
- 8.6.3.4 With the assistance of the QA Manager, maintains the SOP development, review, approval, and distribution system as stated in this procedure.
- 8.6.3.5 With the assistance of the QA Manager, maintains a protected archive of old SOP versions and current versions (controlled document system) for obsolete SOPs.

### 8.6.4 Laboratory Manager - the Laboratory is responsible for the following

- 8.6.4.1 Ensures that all sample analyses requested by the client have a current SOP. If a current SOP does not exist, the Laboratory Manager shall initiate a procedure for creation of an SOP.

### 8.6.5 QA Manager - the Quality Assurance Manager is responsible for the following:

- 8.6.5.1 With the assistance of the Technical Director, assists in SOP development, review, approval, and distribution system as stated in this procedure.
- 8.6.5.2 Ensures SOPs are in compliance with current regulations and established methods.

## 8.7 Definitions

### 8.7.1 Interim Change Notice (ICN) - A document accompanying any SOP or manual as a mandatory change, but is not included in the original text of the manual or SOP until the next revision.

### 8.7.2 Controlled Copy - A copy of an EETSE Atlanta Document or SOP that is updated when revisions are issued. All controlled documents are electronic files.

- 8.7.3 Uncontrolled Copy - A printed copy that is labeled “uncontrolled” and is not updated when revisions are issued.
- 8.7.4 Technical SOPs - Any SOP that directly addresses the laboratory analysis procedure.
- 8.7.5 Non-Technical SOP - Any SOP that is used at EETSE Atlanta but does not directly address the laboratory analysis procedures. Examples: QA, QC, Project Management, and Administrative SOPs.
- 8.8 New Procedure Initiation
- 8.8.1 Immediate Procedure Initiation  
A Temporary SOP should be written when the laboratory receives projects which have requests for analytical procedures that do not have an SOP and the staff feels that the laboratory can perform the requested test procedure in-house.
- 8.8.2 Planned Procedure Initiation  
The department manager/section supervisor, the Laboratory Manager, and the Technical Director determine the need for a new SOP.
- 8.8.3 As part of the New Procedure Request Form, the QA Manager and the Technical Director complete the following:
- 8.8.3.1 The Technical Director assigns the appropriate SOP number.
- 8.8.3.2 The Technical Director completes a Draft SOP or assigns an alternate author.
- 8.8.3.3 The draft SOP is forwarded to the affected laboratory personnel for review (see Section 8.11). The draft includes all of the text, tables, and attachments formatted as outlined in this SOP.
- 8.8.3.4 After review by the affected personnel, the Technical Director finalizes the SOP. A hard copy of the SOP is produced for signature and placed into a folder in the QA Managers office. Controlled electronic copies are made available to laboratory staff in “Read Only” format on the EETSE Atlanta Server and Portal Server.
- 8.9 Standard Operating Procedure Formatting
- 8.9.1 Title Page  
Standard Operating Procedure Title Page Format.
- 8.9.1.1 Title - The procedure is given a concise, descriptive title. When appropriate, Operational Procedure titles should include the parameter(s) analyzed, sample type, method (if applicable), and analysis technique description (e.g., “Fluoride in Water by Ion Selective Electrode, based on EPA Method 353.3”).
- 8.9.2 Comments - This section includes any reasons for revisions and additional comments as necessary.
- 8.9.3 Approval Signatures
- 8.9.4 Header
- 8.9.4.1 All SOPs have the following header on each page:
- 8.9.4.2

8.9.4.4 The following recommended header fonts are used:

|                            | Font         | Font Size |
|----------------------------|--------------|-----------|
| <b>EETSE Atlanta, Inc.</b> | Arial – Bold | 12        |
| Address                    | Arial        | 8         |
| SOP No, etc                | Arial        | 9         |

8.9.4.5 Each procedure is uniquely identified by a five digit number preceded by one of the following identifiers to indicate the type of procedure:

| Identifier | SOP Type                   | # Assignments |
|------------|----------------------------|---------------|
| QA         | Quality Assurance          | 01000 – 01999 |
| AD         | Administrative             | 02000 – 02999 |
| HS         | Health & Safety            | 03000 – 03999 |
| EM         | Emergency                  | 04000 – 04999 |
| QC         | Quality Control            | 05000 – 05999 |
| PM         | Project Management         | 06000 – 06999 |
| GL         | General Laboratory         | 08000 – 08999 |
| SR         | Sample Receiving           | 09000 – 09999 |
| OA         | Organic Analytical         | 11000 – 11999 |
| IA         | Inorganic/Metal Analytical | 13000 – 13999 |
| LP         | Leaching Procedure         | 14000 – 14999 |
| MB         | Microbiology               | 15000 – 15999 |
| ABS        | Asbestos                   | 01000 - 01999 |
| WM         | Waste Management           | 17000 - 17999 |

8.9.4.6 Revision - The first issue of a procedure is not assigned a revision number. It is assigned an “N/A” entry. As revisions are made to the procedure, the revision number is increased sequentially starting with Revision 1 (one).

8.9.4.7 Effective Date - The date when the procedure becomes effective. Use following format: 12/97.

8.9.4.8 Revision Date - Date the current revision became effective. Use the following format: 12/97.

8.9.4.9 Number of Pages - The correct form for this is, Page No.: x of y. Example the fifth page of a 24 page document would be formatted as: Page No.: 5 of 24.

## 8.10 Table of Contents

Section and sub-sections are listed in the Table of Contents using the font in the body of the SOP. See Attachment 3 for an example of an SOP. In addition, all Tables and Attachments are included in the Table of Contents.

8.10.1 Each Manual has a Table of Contents that includes the following information: SOP document number(s), name(s) of the SOP, date(s), revision number(s), and associated Method Number. When SOPs are revised, this list is edited to reflect the changes.

8.10.1.1 The Title of each SOP is Centered, All Capital letters, and in Boldface type on the Table of Contents page.

## 8.10.2 SOP Body - Technical Procedures.

8.10.2.1 All procedures are formatted using this section numbering system:

|         |                           |
|---------|---------------------------|
| 1.0     | <u>SECTION</u>            |
| 1.1     | Sub-Section               |
| 1.1.1   | Sub-Sub-Section           |
| 1.1.1.1 | Sub – Sub – Sub – Section |
| 2.0     | <u>SECTION</u>            |

8.10.2.2 To keep all the SOPs uniform, use Arial Font Size 12 for the document.

8.10.2.3 Each Section is underlined and all capital letters.

8.10.2.4 Copies of forms or logbook pages used in conjunction with the SOP and unique to the SOP are attached as Tables or Attachments; sequentially numbered and referenced in the body of the SOP.

8.10.3 All Technical SOPs include the following sections in the same order:

TABLE 8-1 Technical SOPs

| Section Number – Title                                        | Purpose                                                                                                                                                 | Required Information                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>1.0 SCOPE AND APPLICATION</u>                              | - Describes what the method does<br>- Describes the matrices to which a method applies.<br>-May also describe when the method is to be employed.        | 1. All matrices which may be analyzed using the method.<br>2. Analytes the method is capable of quantifying.<br>3. Quantitation range of analytes.<br>4. Reference to sample                                                                                                           |
| <u>2.0 SUMMARY OF METHOD</u>                                  | Provides a brief description of the procedure and the type of chemistry / instrumentation employed by the laboratory in performing the method.          |                                                                                                                                                                                                                                                                                        |
| <u>3.0 INTERFERENCES</u>                                      | List most common interferences which affect performance of the method. For preparative methods, include interferences which affect the sample analysis. |                                                                                                                                                                                                                                                                                        |
| <u>4.0 SAMPLE COLLECTION, PRESERVATION, AND HOLDING TIMES</u> | List preservation, storage, and holding time requirements for each matrix listed in Section 1.0.                                                        | 1. Preservatives<br>2. Holding Times<br>3. Acceptable container types.                                                                                                                                                                                                                 |
| <u>5.0 REAGENTS AND STANDARDS</u>                             | List all reagents and standards.                                                                                                                        | 1. Purity of reagents.<br>2. All concentrations of reagents and standards required.<br>3. Detailed preparation instructions for each reagent and standard to include initial concentration(s), aliquot volume(s) or weight(s), final volume, final concentration(s), expiration dates. |

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 4. Listing of the Vendor(s) used to purchase the reagent including the catalog number, vendor address, and telephone number.                                                                                                                                                                                                                                                                                                                                                                                                           |
| <u>6.0 APPARATUS AND MATERIALS</u>        | List all apparatus, materials, and equipment, inclusive of data collection and reduction systems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | List make and models or equivalents that might be used in the laboratory                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <u>7.0 PROCEDURE</u>                      | <ol style="list-style-type: none"> <li>1. This section defines the analytical procedure from start to finish.</li> <li>2. Address QA/QC requirements when they are appropriate in the overall sequence of activities.</li> <li>3. Addresses specific record keeping requirements (i.e. when and where to record specific information in run logs and other required laboratory documentation).</li> <li>4. Includes the handling and disposal of waste when appropriate in the overall sequence of activities.</li> <li>5. Calculations are included in the text where applicable following the example of SW-846 methods.</li> </ol> | <p>Includes at a minimum:</p> <ol style="list-style-type: none"> <li>1. Instrument set-up and conditions.</li> <li>2. Calculations of retention times if applicable.</li> <li>3. Initial calibrations.</li> <li>4. Continuing calibrations</li> <li>5. Analysis sequence, including QC requirements.</li> <li>6. Calculations – inclusive of conversions for solids.</li> <li>7. Units required for reporting.</li> </ol>                                                                                                              |
| <u>8.0 QUALITY ASSURANCE REQUIREMENTS</u> | Defines additional QA requirements which must be met in addition to all criteria previously listed in the SOP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <p>Includes a minimum:</p> <ol style="list-style-type: none"> <li>1. Blank requirements.</li> <li>2. Laboratory Control Sample (LCS) requirements.</li> <li>3. Matrix spike requirements</li> <li>4. Matrix spikes duplicate or sample duplicate requirements.</li> <li>5. Any method specific requirements (e.g. MSA for GFAA metals, surrogates for GC/MS procedures, tracers for alpha spectroscopy methods).</li> <li>6. Corrective actions required when requirements are not met.</li> <li>7. Frequency of QC samples</li> </ol> |
| <u>9.0 HEALTH AND SAFETY</u>              | Details specific health and safety requirements for the method and references any general health and safety requirements which may apply.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <ol style="list-style-type: none"> <li>1. Protective clothing required.</li> <li>2. Special hazards associated with chemicals or equipment used in the procedure.</li> <li>3. Storage and / or disposal of all sample extracts and chemicals used.</li> </ol>                                                                                                                                                                                                                                                                          |
| <u>10.0 DATA REPORTING</u>                | Defines the method for data reporting by the staff to clients.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <p>Includes a minimum:</p> <ol style="list-style-type: none"> <li>1. Reporting limits in LIMS.</li> <li>2. Rounding of data.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                |



|                                    |                                                                                       |                                                                                                                                            |
|------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <u>11.0 FILE MAINTENANCE</u>       | Defines the procedures for data transfer and archiving of data for long term storage. | 1. Frequency of data transfer from local computer to server.<br>2. Method used to transfer data to server.<br>3. Data storage requirements |
| <u>12.0 INSTRUMENT MAINTENANCE</u> | Defines the procedures for routine instrument maintenance and entry into logbooks.    |                                                                                                                                            |
| <u>13.0 METHOD PERFORMANCE</u>     | Describes the acceptance criteria published in the method.                            | 1. Spike, duplicate precision and accuracy.                                                                                                |
| <u>14.0 POLLUTION MANAGEMENT</u>   | Describes the procedures required to dispose of hazardous wastes.                     | 1. Waste disposal from received samples.<br>2. Waste disposal from laboratory generated wastes.<br>3. Required forms to be completed.      |
| <u>15.0 DEFINITIONS</u>            | Provides a definition for terms that are used in the SOP.                             |                                                                                                                                            |
| <u>16.0 REFERENCES</u>             | Provides the source(s) of the information from which the SOP was derived.             |                                                                                                                                            |
| <u>17.0 VALIDATION DATA</u>        | Provides the location of information for method validation data.                      |                                                                                                                                            |

Note: The author may add any subsections that are necessary and do not fit in any of the above categories.

## 8.11 SOP Body - Non - Technical (Administrative)

8.11.1 See Sections 8.10 and 8.11

8.11.2 The author may add any subsections that are necessary.

8.11.3 Copies of any forms or logbook pages used in conjunction with and unique to the SOP are attached as Tables or Attachments, sequentially numbered, and referenced in the body of the SOP.

8.11.4 SOP Body - Immediate SOP (See section 8.8.6 for the definition of “Immediate SOP”).

8.11.5 Copy the Regulatory Method

8.11.6 Attach a procedure title sheet

8.11.7 Complete the following sections: 1.0 Health and Safety, 2.0 Reagents and Supplies, and 3.0 Step by Step Procedure. If these sections are included in the regulatory method, the following note can be included under each section: “See Regulatory Method attached section\_\_\_\_\_”.

8.11.8 This is forwarded to the QA Manager who then initiates a new procedure, as described in 8.2.3.

## 8.12 Procedure Review And Revision

Procedures undergo periodic review and are updated whenever regulatory, programmatic requirements or internal process change.

## 8.13 Technical Review

8.13.1 A technical review of the draft SOP is performed by affected laboratory personnel and addresses the following items:

- 8.13.1.1 Does the SOP comply with the technical requirements of the regulatory agency (EPA, USACE, etc.) method?
- 8.13.1.2 Does the SOP state the step by step procedure of how EETSE Atlanta completes the procedure?
- 8.13.1.3 Does the procedure formatting follow the procedures outlined in this section?
- 8.13.2 Comments are written directly on the Draft SOP or on another sheet of paper if needed.
- 8.13.3 The reviewer(s) discuss comments with the Technical Director and arrive at a finalized document.
- 8.13.4 The Technical Director makes the necessary changes electronically. The changes include any Interim Change Notices (ICNs) that have been generated for the SOP and are incorporated as stated in the ICN. The electronic copy is stored in the server in the appropriate year labeled folder.
- 8.13.5 The reviewed SOP is printed and all approval signatures are obtained on the original hard copy.
- 8.13.6 The approved SOP is electronically placed in the “Current Revisions” folder by the Technical Director. All employees have access to these files in a “read only” format.
- 8.13.7 SOP Acknowledgement forms (Attachment 1) are distributed to all area supervisors to distribute to all employees who will be using the procedure.
- 8.13.8 Employees using the new procedure sign SOP Acknowledgement forms and return them to their Supervisor who forwards them to the Technical Director for final approval and scanning.
- 8.14 Procedure Changes
  - 8.14.1 Analysts, supervisors, or management have the ability to request changes to procedures as part of the continuing procedure maintenance using the “Interim Change Notice” (ICN) form (See Attachment 2).
  - 8.14.2 To complete an ICN, make the required changes to a copy of each affected procedure page. Revise and edit these copies using appropriate standard editor’s marks and symbols.
  - 8.14.3 The employee requesting the change ensures the department manager signs the ICN and forwards the ICN to the Technical Director.
  - 8.14.4 The Technical Director signs the ICN, supplies a copy to each applicable department supervisor, ensures that a copy is placed in the controlled SOP folders (see section 8.2), and files it with the controlled QA SOP files.
- 8.15 Standard Operating Procedures Electronic Document Control Process
  - 8.15.1 All controlled documents are electronic files which are password protected and managed by the Technical Director or designee.
  - 8.15.2 All laboratory personnel have access to a controlled, electronic copy of the SOPs applicable to their job description.
  - 8.15.3 Only uncontrolled documents are issued to clients.
  - 8.15.4 The electronic document control files are arranged such that laboratory personnel have access to only current revisions of controlled documents. All archived revisions, draft procedures, etc. are accessible only to authorized QA or Technical Direction personnel via password access.
- 8.16 Uncontrolled copies of Standard Operating Procedures are printed, working copies of the documents, and in that regard, are not monitored or tracked.

#### 8.17 Procedure Archive

The Technical Director is responsible for archiving any procedures that are no longer used at EETSE Atlanta.

8.17.1 Historic hardcopies of SOPs not in use are kept in the Technical Director's office. For SOPs associated with AIHA LAP accreditation, the documents are marked "Void" so it is clear they are not in use.

8.17.2 Retired electronic SOPs related to the AIHA LAP are marked as "Obsolete" via a watermark. All electronic SOPs are moved by the Technical Director to the designated archive directory.

8.17.3 Technical Director removes the folder from the "active" files and places it in the archived files.

#### 8.18 Temporary Change

Temporary changes to an SOP may be required for the following reasons: a sample matrix does not permit the SOP steps to be followed as written, or if a client desires a change to an SOP that is currently in use at EETSE Atlanta.

8.18.1 The Temporary Change Notice is completed and approved prior to the use of a revised procedure. See Attachment 2.

## Attachment 1

QUALITY ASSURANCE MANUAL  
STANDARD OPERATING PROCEDURE  
ACKNOWLEDGEMENT

Name (Printed): \_\_\_\_\_

SOP Title: Quality Assurance ManualSOP Number: QA-01000 Rev. No. 30

The laboratory analyst signature on this approved SOP signifies the following: The analyst has read the SOP in its entirety and has read the analytical methods referenced in the SOP.

The analyst understands that the SOP is to be followed explicitly. Any deviation from the SOP must be noted in writing. Furthermore, the deviation from the SOP must be approved in writing by the laboratory supervisor and the QA staff prior to the analyst's adoption of the deviation from the SOP.

The controlled electronic copy of this SOP is located on the portal server at: Documents: Quality Assurance: QA Manuals: QA Manual: [2024\\_QA\\_Manual\\_Rev\\_30.pdf](#). If a hard copy is desired, you may request one from the Manager/Supervisor.

*Do not make a copy or print out the QA Manual yourself. Printed copies are uncontrolled documents.*

Print Name: \_\_\_\_\_

Date: \_\_\_\_\_

Analyst's Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Department Manager Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Technical Director's Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## Attachment 2



Environment Testing

Atlanta  
3080 Presidential Drive  
Atlanta, GA 30340

### Temporary SOP or Interim (Temporary or ☒ Permanent) Change Notice (circle one as appropriate)

Date:

Employee Requesting Change:

SOP Number:

Reference Method Number:

SOP Title/Rev:

Permanent Change Requested:

#### Approvals (Signature/Date)

Technical Director

Date

Laboratory Director

Date

Quality Assurance Manager

Date

Department Manager

Date

## 9.0 CALIBRATION PROCEDURES AND FREQUENCY

### 9.1 Identification and Control of Materials, Parts and Components

General. Materials, components or items that are used directly in the production of samples or data that, if not controlled, could jeopardize data quality must be identified.

#### 9.1.1 Traceability of Measurement Policy (for AIHA LAP and other accreditations)

Under EETSE Atlantas' various accreditations (i.e. AIHA LAP accreditation), the laboratory shall demonstrate, when possible, that calibrations of critical equipment and hence the measurement results generated by that equipment, relevant to their scope of accreditation, are traceable to the SI (International System of Units) through an unbroken chain of calibrations.

- 9.1.1.1 External Calibration services shall, whenever possible, be obtained from providers accredited to ISO/IEC 17025 by an ILAC recognized signatory, a CIPM recognized National Metrology Institute (NMI), or a State Weights and Measures Facility that is part of the NIST Laboratory Metrology Program. Calibration certificates shall be endorsed by a recognized accreditation body symbol or otherwise make reference to accredited status by a specific, recognized accreditation body, or contain endorsement by the NMI. Certificates shall indicate traceability to the SI or reference standard and include the measurement result and if available the associated [measurement uncertainty](#).

If externally provided products and services that affect laboratory activities or are used to support the operation of the laboratory are necessary, the laboratory will ensure they are suitable. When such products and services are intended for incorporation into the laboratories own activities, they are provided directly to the customer by the laboratory, as received from the external provider.

- 9.1.1.2 Where traceability to the SI is not technically possible or reasonable, the laboratory shall use certified reference materials provided by a competent supplier, or use specified methods and/or consensus standards that are clearly described and agreed to by all parties concerned. A competent supplier is an NMI or an accredited reference material producer (RMP) that conform with ISO Guide 34 in combination with ISO/IEC 17025, or ILAC Guidelines for the Competence of Reference Material Producers, ILCA G12. Conformance is demonstrated through accreditation by an ILAC recognized signatory.

- 9.1.1.3 Reference materials shall have a certificate of analysis that documents traceability to a primary standard or certified reference material and associated uncertainty, when possible. Where possible, reference materials such as calibration standards should be purchased from a supplier that conforms to ISO Guide 34. When applicable, the certificate must document the specific NIST SRM® or NMI (National Metrology Institute) certified reference material used for traceability.

Calibrations performed in-house shall be documented in a manner that demonstrates traceability via unbroken chain of calibrations regarding the reference standard/material used, allowing for an overall uncertainty to be estimated for the in-house calibration.

Calibration shall be repeated at appropriate intervals, the length of which can depend on the uncertainty required, the frequency of use and verification, the manner of use, stability of equipment, and risk of failure considerations. Table 9-1 provides minimum frequencies.



Periodic verifications shall be performed to demonstrate the continued validity of the calibration at specific intervals between calibrations. The frequency of verifications can be dependent on the uncertainty required, the frequency of use, the manner of use, stability of the equipment, and risk of failure considerations. Internal calibrations and verifications are performed at the stated frequencies in Table 9-1. Reference thermometers, hygrometers, and masses, will be repurchased at the stated frequency rather than recalibrated. This has been determined to be more cost effective.

The laboratory has procedures describing their external and internal calibration and verification activities and frequencies, and the actions to follow if equipment is found to be out of acceptable specification. Laboratory staff performing in-house calibration and verifications shall have received documented training.

- 9.1.1.4 Standard tracking: Standards and reagents are tracked in the LIMS chemical inventory system for traceability and auditing purposes. The method of standard and reagent tracking is outlined in the subsequent sections.
  - 9.1.1.4.1 When a standard or reagent is needed that is not already on the approved vendor / materials order list, supervisors forward purchase requests to the Technical Director and / or Laboratory Manager for approval. The standard or reagent is ordered from a reputable supply house (EETSE Atlanta typically uses VWR).
  - 9.1.1.4.2 The information supplied to the Technical Director and / or Laboratory Manager must have the supplier standard or reagent name, order number, size or amount of each unit, grade or purity, price, if possible, and quantity. Upon receipt, supplies (and services) are reviewed to ensure they comply with requirements. When a vendor has been approved for services, a note is placed in the comments field of the Vendors database within LIMS.
  - 9.1.1.4.3 When the standard or reagent arrives, it is logged into the LIMS, usually by the department supervisor or by the sample custodian. All reagents and standards received are electronically tracked and documented by computer via the Laboratory Information Management System.
  - 9.1.1.4.4 Each standard or reagent is given a unique chemical inventory number upon receipt. The next available number in the LIMS is automatically assigned, starting with #5001. The computer entry is completed by entering the correct information in the required fields.
    - 9.1.1.4.4.1 The expiration date for neat standards and reagents is determined using the manufacturer's expiration date, if available. Otherwise, a 1 year expiration date is assigned to volatile organic compounds and standards and 5 year date for acids, dry chemicals, solvents, reagents, and other chemicals. Each standard and reagent is clearly and permanently labeled with its expiration date in indelible ink. The assigned expiration date for intermediate standards will not exceed the manufacturer's expiration date of the stock standard.
    - 9.1.1.4.4.2 Secondary standard containers are labeled with the corresponding LIMS tracking number of the source material, the date the contents were prepared, the six month expiration date, the name of the analyte(s), the concentration of each component of the solution, the matrix and the initials of the person who prepared it.
    - 9.1.1.4.4.3 The chemical inventory number must appear on both the standard and reagent container, and the upper, right-hand corner of the certificate of analysis. It must also be included, if applicable, in standard/preparation, analyses or sample preparation log books.

- 9.1.1.4.4.4 Secondary standard labels **must** include **at minimum**: the LIMS chemical inventory number **and expiration date**. **If space is available, secondary label shall also include all of the following**: the LIMS chemical inventory number, standard name, intended use (spiking, surrogate, reference, or calibration solution), concentration with units, matrix, expiration date, and initials of the person who prepared **the standard**. As long as **all of the aforementioned information** is available, all other information can be found in the LIMS.
- 9.1.1.4.4.5 Spiking, surrogate, reference and calibration solutions and calculations are recorded in the appropriate “Standard/Preparation Log Book.” Logbooks cover the following areas: Organics, Organics Preparation, Semi-Volatile Organics, Microbiology, Metals, Mercury & Wet Chemistry.
- 9.1.1.4.4.6 Some containers such as standards containers for organics are small and there may not be enough room to list all of the required information on the container. Should this occur, it is permissible to attach a label to the bottle.
- 9.1.1.4.4.7 When a standard or reagent is added to a sample for any reason, the LIMS chemical inventory number of that standard or reagent and the amount added must be recorded in the appropriate logbook. For example, if a stock standard MET #33-89-5431 of 1000 mg/L is diluted to 100 µg/L, the following line is entered: 1 ml MET #33-89-5431 to 100 ml DI water, 1 ml of 100x to 100 ml DI water, final conc. = 100 µg/L. (NOTE: “MET #33-89-5431” = Metals Department Standard/ Preparation Log Book 33, page 89, LIMS Chemical Inventory Number 5431).
- 9.1.1.4.4.8 If the standard is used as a stock standard and aliquots of it are diluted to produce working standards, the stock standard’s LIMS chemical inventory number is used. The standard concentration or a designator such as “1” or “A” is used to differentiate between each serial dilution.

Table 9-1  
Minimum Calibration / Verification Frequency Requirements (for AIHA LAP and other accreditations)

| Reference Standard / Equipment | Calibration Frequency                  | Verification Frequency |
|--------------------------------|----------------------------------------|------------------------|
| Balances                       | Initial and Annually                   | Each day of use        |
| Mechanical Pipettors           | Initial and when verification fails*   | Quarterly              |
| Reference Thermometers         | Initial and every 5 years**            | Not applicable         |
| Reference Hygrometers          | Initial and every 5 years**            | Not applicable         |
| Digital Thermometers           | Initial and when verification fails*   | Quarterly              |
| Alcohol-Hg-Spirit Thermometers | Initial and when verification fails*   | Semi-annual            |
| Reference Masses               | Initial and every 5 years**            | Not applicable         |
| Stage Micrometer               | Initial, if damaged, and every 7 years | Not applicable         |

\*Verified internally.

\*\*These reference standards will be repurchased instead of recalibrated in-house.

## 9.1.2 Control of Materials, Parts and Components

When appropriate, identification of each item is maintained by part number, serial number, or other appropriate methods, either directly on the item, or by labels or records traceable to the item. The system is designed to prevent the use of incorrect or defective items and to maintain identify and control inventory. When appropriate, the system controls items by batch number rather than by individual item. Instrumentation not currently in use or equipment undergoing repair is labeled as “Out of Service.”

### 9.1.3 Handling, Storage and shipping

#### 9.1.3.1 General

This criterion establishes requirements for the proper handling, storage, preservation and shipping of materials, supplies and equipment.

#### 9.1.3.2 Procedures and Responsibilities

All items affecting quality are handled and stored in such a manner as to prevent deterioration and damage to the quality. Items that require shipping are packed to prevent damage. Managers and supervisors are responsible for items under their control.

### 9.1.4 Procurement Document Control

#### 9.1.4.1 General

9.1.4.1.1 Vendors of analytical material supplied to EETSE Atlanta are regarded as a resource to, and an extension of the laboratory organization. The standards for quality identified in this document shall be applicable to vendors.

9.1.4.1.2 The purpose of the procurement control criterion is to ensure the quality and traceability of procured quality related items (equipment, materials, or services), whose specification could affect the quality of the services of EETSE Atlanta. This includes such quality related items as the calibration of instruments by outside laboratories (when appropriate), purchase of standards, subcontracted services and materials requiring testing before use, as determined by the QA Manager.

#### 9.1.4.2 Procedures and Responsibilities

9.1.4.2.1 It is the responsibility of the purchasing agent to provide assurance, when required, that all applicable regulatory requirements, industry codes and standards appear in the purchase documentation for affected services and products.

9.1.4.2.2 The Purchasing Department retains purchase orders for control purposes.

9.1.4.2.3 Purchased items which do not meet the minimum standards set forth by the purchasing agent are processed according to procedures set forth in Section 13, "Corrective Actions."

9.1.4.2.4 The appropriate Manager/Supervisor and QA Manager review purchase orders, which may affect quality-related services or products.

9.1.4.2.5 Purchase orders for standard catalog items except those described herein, are exempt from QA review.

### 9.1.5 Non-conformance

The purpose of this criterion is to establish a system to control materials, parts, or components that do not conform to established requirements in order to prevent their inadvertent use. When significant deficiencies in analytical procedures, materials or components has or may lead to the release of incorrect analytical results to the customer, a Corrective Action Report (CAR) is issued.

#### 9.1.5.1 Procedures and Responsibilities

The Laboratory Manager and the purchaser perform the inspection of the newly received material and equipment. Nonconforming items that fail incoming receipt inspection are identified and segregated until disposition is determined and documented by the Non-Conformance Report. Copies of these documents are maintained by the Purchasing Department or the QA Department, as applicable.

## 9.2 Instrumentation List

The laboratory maintains an Equipment List spreadsheet of all instrumentation used. The information documented in this spreadsheet includes a unique EETSE Atlanta ID number for each piece of equipment along with type of instrument, manufacturer, model, serial number, software and revision number, firmware, and date received. It also lists in-house standards of traceability such as certified analytical balance weights and calibration thermometers.

In addition, the item, model, serial number, date received, and the date placed into service. Appendix III, "Equipment List," is a summary of the laboratory equipment spreadsheet (For the complete information see the Equipment List spreadsheet).

## 9.3 Measurement Traceability and Calibration / Procedures for achieving Traceability of Measurements

### 9.3.1 General

The purpose of this criterion is to assure that instruments and other measuring and testing devices used in activities affecting program quality are properly controlled, calibrated and adjusted at specified periods to maintain accuracy within design and/or procedure limits. Implementation procedures consist of the following as applicable:

#### 9.3.1.1 Identification and control of the item

9.3.1.2 Creation of calibration schedules and procedures based on instrument type, planned use, and design limits and program requirements.

9.3.1.3 Development of calibration sources for use in confirming successful equipment operation.

9.3.1.4 Maintenance of equipment history records to indicate past and status, and to provide reproducibility and traceability of results.

### 9.3.2 Responsibility

Under the direction of the manager, the supervisors are responsible for the quality of measuring and test equipment under his/her control and for the maintenance of records of calibrations and checks.

### 9.3.3 General Requirements

All measuring operations and testing equipment having an effect on the accuracy or validity of tests shall be calibrated and/or verified before being put into service and on a continuing basis. The laboratory has an established program for the calibration and verification of its measuring and test equipment. This includes balances, thermometers and control standards.

### 9.3.4 Traceability of Calibration

9.3.4.1 The overall program of calibration and/or verification and validation of equipment ensures that, wherever applicable, measurements made by the laboratory are traceable to national standards of measurement.

9.3.4.2 Calibration certificates indicate the traceability to national standards of measurement and provide the measurement results and associated [measurement uncertainty](#). Certificates are maintained in the Quality Assurance office files.

9.3.4.3 The laboratory maintains calibration certificates that provide traceability to each standard chemical used within the laboratory. As these standards are purchased, the certificates that accompany the standards are stored in logbooks. Information included in the logbooks includes labels provided by the manufacturer, expiration date, lot number, etc. This information is stored separately for standards purchased by each department and can be accessed by all personnel within the department.

9.3.4.4 Where the traceability of national standards of measurement does not apply, EETSE Atlanta shall provide satisfactory evidence of correlation of results by participation in a program of inter-laboratory comparisons, proficiency testing studies or independent analysis.

### 9.3.5 Reference Standards

9.3.5.1 Reference standards, as Class 1 weights or traceable thermometers, are used for calibration only and no other purpose, unless it can be demonstrated that their performance as reference standards will not be invalidated. EETSE Atlanta, Inc., maintains certified Class 1 weights, thermometers which have been calibrated by outside agencies that can provide traceability to national standards of measurement. The stage micrometer will be calibrated by a NIST traceable reference.

9.3.5.2 The calibration and verification of reference standards occurs every five years for Class 1 weights and thermometers and every seven years for stage micrometers.

9.3.5.3 Where relevant, reference standards and measuring and testing equipment shall be subjected to in-service checks between calibrations and verifications. These reference materials shall, where possible, be traceable to national or international standard reference materials. [Standards traceable to NIST, which are used by the laboratory, are listed within individual SOPs.](#)

9.3.6 Calibration- Calibration requirements are divided into two parts: 1) requirements for analytical support equipment, and 2) requirements for instrument calibration. In addition, the requirements for instrument calibration are divided into initial instrument calibration and continuing instrument calibration verification.

9.3.6.1 Instrument Calibration - Analytical instruments are calibrated in accordance with the proper analytical procedure to determine the analyte(s) of interest. After initial calibration of an instrument, a continuing calibration standard is analyzed at specific intervals. The calibration standards must meet the specified QC requirements associated with each test method (see Section 5).

### 9.3.7 Control of Measuring and Test Equipment

9.3.7.1 The purpose of this criterion is to assure that instruments and other measuring and testing devices used in activities affecting program quality are properly controlled, calibrated and adjusted at specified periods to maintain accuracy within design and/or procedure limits.

9.3.7.2 Equipment calibration specific to microbiological analysis.

The laboratory, under the direction of the section leader, determines and documents temperature stability, uniformity of temperature distribution, and time required to achieve equilibrium conditions in incubators and water baths. This procedure is performed during the following two conditions.

9.3.7.2.1 When new equipment is purchased

9.3.7.2.2 On an annual basis for existing equipment

9.3.7.3 Volumetric accuracy checks for disposable pipettes used in microbiological analysis. The laboratory, under the direction of the section leader, determines and documents volumetric accuracy of disposable pipettes. This is accomplished by checking 5 pipettes per case lot.

9.3.7.4 Mechanical timer accuracy checks. The laboratory, under the direction of the section leader, determines and documents the accuracy of mechanical timers. This is done by the following method and frequency.

9.3.7.4.1 Accuracy check is performed on an annual basis and is documented in the logbook.

9.3.7.4.2 Accuracy is compared against an electronic timing device such as a stopwatch.



## 9.3.7.5 General Responsibility

Under the direction of the manager, the supervisors are responsible for the quality of measuring and test equipment under his/her control and for the maintenance of records of calibrations and checks.

## 9.3.8 Reference Measurement Standard List

Reference measurement standards must originate, wherever possible, from sources traceable to NIST. Table 9-3 describes the major standards used in the laboratory and their sources:

Table 9-3  
Reference Measurement Standard List

| Chemical Standard        | Manufacturer/Vendor              |
|--------------------------|----------------------------------|
| PAH Mix                  | VWR-Restek, Supelco              |
| Toxaphene                | ERA, Accustandard, Absolute Stds |
| Chlordane                | ERA, Accustandard, Absolute Stds |
| Hexavalent Chromium      | ERA, Accustandard, Absolute Stds |
| LAS (MBAS)               | ERA, Accustandard, Absolute Stds |
| Calcium Carbonate        | ERA, Accustandard, Absolute Stds |
| TSS                      | ERA                              |
| O&G                      | ERA, Accustandard, Absolute Stds |
| Chemical Standard        | Manufacturer/Vendor              |
| Aroclor Mix (PCB)        | ERA, Accustandard, Absolute Stds |
| 8260B Matrix Spike       | VWR-EM Science                   |
| EPA 625 Kit              | Restek                           |
| Sodium Nitroferrocyanide | VWR-Mallinckrodt                 |
| Sodium salicylate        | VWR-J.T. Baker                   |
| Phosphate (P) Standard   | Labchem, Inc.; Ricca             |
| Mercuric Oxide           | VWR-J.T. Baker                   |
| Multi-element Metals Std | SCP                              |
| Antimony Standard        | SCP                              |
| Furan                    | Aldrich Chemical                 |
| Herbicides Mix           | ERA, Accustandard, Absolute Stds |
| DRO/GRO                  | ERA, Accustandard, Absolute Stds |
| EDB, DBCP                | ERA, Accustandard, Absolute Stds |
| turbidity                | ERA, Accustandard, Absolute Stds |
| 8270C Mix                | ERA, Accustandard, Absolute Stds |
| Semi-Vols Mix            | RTC                              |
| 1,2-diphenylhydrazine    | Restek                           |

## 10.0 PREVENTIVE MAINTENANCE

### 10.1 Instrument Maintenance

All instrument maintenance is recorded in an instrument specific logbook. Entries are dated and initialed by the analyst making the entry.

#### 10.1.1 Routine

All analytical instruments have a routine schedule of maintenance specified by the manufacturer. Routine maintenance is designed to keep the instrument in good operating condition with as little "down-time" as possible. All Analysts should be proficient in maintaining the instruments for which they are responsible.



## 10.1.2 Non-Routine

Any maintenance which must be performed in order for sample analysis to proceed, but is not part of the systematic maintenance schedule, is considered non-routine. Non-routine maintenance must be reported to the Section Supervisor immediately so that its impact on production can be determined. If the ability to analyze samples is adversely affected, the Section Supervisor notifies the Client Services Manager so that alternative action can be coordinated with the client.

(Note: See Appendix II for a complete instrument maintenance summary.)

## 10.2 Preventive Maintenance

### 10.2.1 Maintenance Schedule

EETSE Atlanta is equipped with up-to-date computerized instrumentation. In order to gain maximum performance and minimize downtime, regular inspection, maintenance, cleaning, and servicing of all laboratory and field equipment is performed according to the manufacturers' recommendations.

10.2.2 A maintenance log is kept for each piece of laboratory and field instrumentation, detailing all maintenance performed on the instrument.

10.2.1.1 Routine repairs and maintenance are performed and documented by the analyst responsible for the particular instrument.

10.2.1.2 A log of non-routine maintenance is kept in the instrument repair logbook. As part of this information, the analyst or repair technician signs and dates the logbook.

10.2.1.3 Routine maintenance procedures for laboratory instrumentation are given in Appendix II. The service intervals listed in Appendix II are as follows: D = daily; W = weekly; M = monthly; Q = quarterly; SA = semi-annually; and AN = as needed. (A list of all laboratory equipment may be found in Appendix III.)

10.2.3 An extensive approved spare parts inventory is maintained for routine repairs at the facilities, consisting of GC detectors, AA lamps, fuses, printer heads, flow cells, tubing, certain circuit boards and other common instrumentation components.

10.3 Glassware used in general laboratory operations must be of high quality borosilicate glass (e.g. Pyrex or Kimax). Volumetric dispensing glassware must be Class A wherever possible.

Glassware Cleaning. Laboratory glassware cleaning procedures & guidelines are described in Table 10-1.

TABLE 10-1  
LABORATORY GLASSWARE CLEANING PROCEDURES

| Analysis/Parameter              | Cleaning Procedure (In Specified Order)                |
|---------------------------------|--------------------------------------------------------|
| Extractable Organics (including | Solvents: 13, 1, 2, 3, 4, 7, (6 or 8 optional), 15, 17 |
| Pesticides and Herbicides)      | Or, Muffle Furnace: 13, 1, 2, 3, 4, 14, 15, 17         |
|                                 | Or, Oxidizer: 13, 1, 2, 3, 16, 3, 4, 15, 17            |
| Analysis/Parameter              | Cleaning Procedure (In Specified Order)                |
| Purgeable Organics              | 1, 2, 3, 4, (7 optional), 11                           |
|                                 | Or, 1, 2, 3, 4, (8 optional), 11                       |
|                                 |                                                        |
| Trace Metals                    | 1, 2, 3, 4, 10, 4                                      |
|                                 |                                                        |
| Nutrients, Other Wet Chemistry  | 1, 2, 3, 4, 9, 4                                       |
|                                 |                                                        |

|                                   |                   |
|-----------------------------------|-------------------|
| TKN                               | 1, 2, 3, 4, 18, 4 |
| Minerals, Demands, CN and Phenols | 1, 2, 3, 4        |
| Microbiology                      | 1, 2, 3, 4        |
| Residues                          | 1, 2, 3, 4, 12    |

## Key to Laboratory glassware cleaning procedures:

- 1 Remove all labels with sponge or acetone
- 2 Wash with hot tap water, scrub stopcocks, and other small parts with brush and inside labware using a laboratory-grade detergent
  - Organics – Liquinox, Alconox or equivalent
  - Inorganic Anions – Liquinox or equivalent
  - Inorganic Cations – Liquinox, Acationox, Micro or equivalent
- 3 Rinse thoroughly with hot tap water
- 4 Rinse thoroughly with Deionized (DI) water
- 6 Rinse thoroughly with pesticide-grade methylene chloride
- 7 Rinse thoroughly with pesticide-grade methanol
- 8 Rinse thoroughly with pesticide-grade hexane
- 9 Rinse thoroughly with Deionized (DI) water
- 10 Rinse or soak with 1:1 HCl
- 11 Rinse thoroughly with Deionized (DI) water
- 12 Rinse or soak with 10% HNO<sub>3</sub>
- 13 Rinse thoroughly with Deionized (DI) water
- 14 Bake at 105°C for 3-4 hours (Note: Class A volumetric glassware must NOT be baked!)
- 15 Bake crucibles at 105°C or 180°C for 1 hour (prior to use, as per method)
- 16 After use, rinse with same solvent used
- 17 Drain, let air dry
- 18 then heat in muffle furnace for 15-30 minutes
- 19 Store inverted or capped with suitable material or container stopper
- 20 Soak in oxidizing agent: chromic acid or equivalent
- 21 Rinse with solvent used in analysis as the last step prior to use
- 22 Rinse or soak with 1:1 H<sub>2</sub>SO<sub>4</sub>

Note: Do not let it run continually while washing glassware due to a limited supply of Deionized Water.

## 10.4 Contamination Control

Monitoring for contamination is an important factor in order to ensure the highest quality analytical results. A documented routine monitoring program is in place to verify adequate contamination control. Monitoring is present in several forms.

10.4.1 Media (or Method) Blank is analyzed with every batch of samples to show that the extraction and analytical processes are free of contamination. Clean, unused sampling media undergoes the same preparation and analysis as the samples. The same acids, solvents, and other reagents are used as applicable, with each batch of samples. Typical media includes wipes, filters, and air cartridges.

10.4.2 Routine air monitoring is performed and documented monthly to monitor background levels of fibers (PCM) and fungal spores. Samples are collected in the appropriate locations, logged into the LIMS by the QA Department, and results are evaluated by the department managers.

10.4.3 In addition to Method Blanks, the Volatiles Department performs a daily DI water check for contaminants to ensure the starting water for the day meets acceptable criteria. This provides an indication that resin beds and charcoal are need of changing.

10.4.4 Work areas are routinely wiped down and cleaned to remove contamination. The laboratory performs quarterly lead dust wipe checks to ensure the cleaned areas are free from contamination. Dust wipes

are logged in quarterly for designated areas determined by the QA Department. A 12 inch by 12 inch template is used to wipe down defined areas to check. If analytical results are unacceptable for any area, that location is thoroughly cleaned once again followed by re-sampling and analysis.

- 10.4.5 Hoods are also cleaned on a regular schedule to reduce the chance of contamination in the Asbestos, Metals, and Sample Receiving areas.
- 10.4.6 Certificates of Analysis and contamination checks received from media (bottle) suppliers are maintained on file by lot # to show items were contaminant free when used for sample collection. In addition, the laboratory performs testing of bottles for selected analysis.
- 10.4.7 In order to minimize sample contamination, test strips should not be dipped into the sample or onto material on the bottle cover. To check the sample with test paper (such as pH paper or KI paper used for residual chlorine, except for Coliform testing. See next paragraph.), take a clean disposable pipette and draw sample from the top of the aqueous surface. Remove the pipette, recap the sample and touch the pipette to the test paper. Read the paper to the nearest pH unit.

When checking for residual chlorine on coliform samples, either pour sample out of the container directly onto the KI paper or touch the paper to the remaining droplets in the container after the sample has been poured out.

## 11.0 QC CHECKS AND ROUTINES TO ASSESS PRECISION, ACCURACY AND METHOD DETECTION LIMITS

### 11.1 Control of Special Processes

- 11.1.1 In certain processes, the existence of a required level of quality cannot be assured by the examination of the end result alone. Such special processes that relate to the conduct of programs include performance of detailed chemical procedures, interpretation of raw data and the use of advanced data analysis techniques.
- 11.1.2 For such processes, quality assurance is obtained through the development of thorough analytical and operational procedures. QA is also obtained by personnel screening and documented training to ensure the necessary level of personnel qualifications and capabilities and by the use of QC samples. This section describes how personnel are qualified in accordance with specified requirements.

### 11.2 Quality Control in the Laboratory

- 11.2.1 Various types of quality control samples are used at EETSE Atlanta, Inc., in each of the following areas:

- Bulk Asbestos
- Air Asbestos
- Gas Chromatography/Mass Spectrometry
- Gas Chromatography
- Inorganic Analysis
- Wet Chemistry
- Microbiology
- Sample preparation

- 11.2.2 Some of the activities used to qualify the procedures (and data) are described:

#### 11.2.2.1 Standards

The Section Supervisor (or designee) is responsible for the preparation and documentation of stock standards and working standards. Standard reference materials are obtained from suppliers and have Certificates of Analysis to certify the analyte concentrations. When available, traceable reference materials are to be used. As a minimum, information on reference materials includes manufacturer, lot or batch number, date of receipt, expiration date,

and any other accompanying preparation or assay information. The most recent release of the NIST standards library shall be used for mass spectral interpretation.

### 11.2.2.2 Calibration and Performance Check of Instruments

Different types of reference material are used to calibrate the various analytical instruments in the laboratory areas. For most of the analytical instruments used in the laboratory, calibration and performance checks are conducted at the beginning of an analytical run, periodically throughout the run and at the end of the run, (e.g., Atomic Absorption Spectrophotometers), while others are calibrated once then checked daily. The performance checks must be from an outside source, such as an alternate manufacturer, or may be from the same manufacturer as long as it originates from a different lot or batch. Calibration is also performed when the analytical method is initially set-up, when an instrument has been through major maintenance, or the instrument fails its QC check.

### 11.2.2.3 Inter-Laboratory Analysis of QC Samples

Client and method requirements determine the frequency and type of spikes, blanks, splits, method standards, surrogate standard, internal standard and external source analyses. These normally account for 10 – 20% of the data points generated by the laboratory.

### 11.2.2.4 Inter-Laboratory Analysis

EETSE Atlanta, Inc. participates in various accreditation programs that require the analysis of either agency-supplied performance samples or proficiency test study samples purchased from a TNI or AIHA LAP approved PT provider as required. Results of these performance results are reported and maintained in QA files. Results which are evaluated as “Not Acceptable” are documented and reviewed by the Quality Assurance department and resolved through discussion with analysts and their supervisors, examination of all raw data, re-assessment of sample preparation directions and techniques, and a review of data and calculations.

### 11.2.2.5 Computational Checks

Any hand calculations are checked by a second individual, in most cases the section supervisor. The person performing the crosscheck must be qualified in the relevant technical discipline. For computations performed automatically using verified software, and which contain a hard copy of the entered computation, only the entries are checked.

### 11.2.2.6 Review and Analysis of Data

The review and analysis of data for analytical measurements are performed on a timely basis using Quality Control checklists. The data is checked for reasonableness and consistency by the section Supervisor and/or the manager.

### 11.2.2.7 Detection Limit Studies

The detection limit of an analyte is defined as the smallest amount of an analyte that can be detected (for instrumentation, above the background noise) within a stated confidence limit. There are several types of detection limits that may be applicable to a given method. The Instrument Detection Limit (IDL) is the amount of analyte needed to produce an adequate response above an instrument's baseline noise. The IDL may be use to estimate a Method Detection Limit (MDL). The Practical Quantitation Limit (PQL), also called the Reporting Limit (RL) is defined as the lowest level of quantitation achievable during routine laboratory operations. Some agencies define the PQL more rigidly as 3.33 times the MDL. However, the PQL is highly matrix dependent.

## 11.2.2.8 Recovery of Known Additions (Spikes)

Recoveries of known additions of analytes are used to determine the effect of the sample matrix on the given analytical procedure. The Laboratory Control Sample (LCS) and sample Matrix Spike/Spike Duplicate (MS/MSD) are used to monitor and control the analytical process. The recovery of spiked analytes in the sample matrix gives a definitive measure of the sample preparation processes.

11.2.2.8.1 LCS data is used to monitor the laboratory's performance in respect to sample preparation and equipment operation. It is prepared in an analyte free matrix similar to the sample, i.e. water or soil. Recovery limits for the LCS are established by the laboratory through control charting of each analyte.

11.2.2.8.2 A matrix spike/matrix spike duplicate pair is analyzed to determine the effect of the sample matrix on extraction efficiency and analyte recovery. One MS/MSD pair should be prepared and analyzed in every batch of 20 or fewer samples when possible. In some cases, the client may specify which sample is to be used for the MS/MSD. If not, the laboratory picks a representative sample at random. Advisory MS/MSD recovery limits are established for aqueous and soil matrices. For TCLP analysis, a matrix spike is prepared and analyzed for each waste type (e.g. oil, solid) associated with a batch of 20 or fewer samples of similar matrix.

## 11.2.2.9 Surrogates

As a means of monitoring individual sample extraction efficiency, one or more surrogate compounds are added to each blank, LCS, client sample, and QC sample prior to preparation. Recovery limits for surrogate compounds are established by the laboratory through control charting of each analyte. Typically, one of the following actions will be required when a sample surrogate recovery is out of the established control limits.

- Re-extract and/or reanalyze the sample
- Flag the results as estimated

11.2.2.10 Clients may specify the required action to be taken for recovery failure. Client specific requirements are conveyed to the analytical sections through project management.

## 11.2.3 Tracking Internal QC Samples

The tracking of internal QC samples through the LIMS provides laboratory personnel with various types of information. This information is used for the following purposes:

11.2.3.1 Long term trends are monitored through the use of quality control charts. Any upward or downward change in the recovery of analytes signifies that some procedural change has taken place. If trending is observed, the Technical Director reviews all test procedures and makes any corrections as required.

11.2.3.2 The number of quality control samples as a function of total laboratory samples is monitored so as to ensure that the laboratory analyzes the adequate number of Quality Control samples for each extraction or analytical batch.

11.2.3.3 The following guidelines are followed when implementing and utilizing QC Charts:

11.2.3.3.1 Through LIMS the Technical Manager plots the percent recovery of the LCS analyte versus the date of preparation or analysis; whichever is most appropriate.

11.2.3.3.2 For organic analyses employing surrogates, the LCS surrogate % recoveries are monitored on QC Charts. The recovery of at least one target Aroclor (PCB) in the Pesticide/PCB LCS is monitored on a QC Chart (e.g. TPH).



- 11.2.3.3.3 For trace metals determined by inductively coupled plasma (ICP) at least three metals spiked in the LCS are monitored on QC Charts (e.g. Cd, Cr, Ni). For trace metals determined by graphite atomic absorption (GFAA) and cold vapor atomic absorption (CVAA), an LCS for each element is monitored on a QC chart.
- 11.2.3.3.4 For General Chemistry, an appropriate LCS for each method is used. Each LCS analyte recovery method is monitored on a control chart.
- 11.2.3.3.5 Each section, prior to the calculation of in-house limits, establishes initial control limits. These preliminary limits are derived from published method criteria if available. If no such criteria are available, the preliminary limits will be mutually set (usually interim limits are set at 70-130% as stated in SW-846) and agreed to by the Department Manager, Technical Director, and Quality Assurance Manager. Twenty data points are recommended to establish the initial calculated control limits. In some cases, it may be appropriate to use fewer data points to establish the first set of calculated limits, however, at no time should fewer than seven data points be used.
- 11.2.3.3.6 Control chart limits are updated periodically when sufficient additional data points are available. Typically, limits are updated for each set of 20 to 50 new data points. More frequent updates may be warranted in some cases
- 11.2.3.3.7 Each control chart has upper and lower warning limits established at  $\pm 2$  standard deviations ( $2\sigma_{n-1}$ ) from the mean % recovery (centerline)
- 11.2.3.3.8 Each control chart has upper and lower control limits established at  $\pm 3$  standard deviations ( $3\sigma_{n-1}$ ) from the mean % recovery (centerline).
- 11.2.3.3.9 The analyst performing the method enters the data into LIMS. The data is evaluated frequently to identify trends that might occur in an “out of control” situation
- 11.2.4 The method blank is an analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank is carried through the complete sample preparation and analytical procedure. The method blank is used to document contamination resulting from the analytical process.  
  
 For the method blank to be acceptable for use with the accompanying samples, the concentration of the blank of any analyte of interest cannot exceed the method detection limit or required reporting limit. Section 5 lists certain conditions in which contaminated blanks may be used for quality control purposes.
- 11.2.5 An instrument blank may be run after any sample that gives a response that exceeds the calibration range for the instrument to show that there is no carry-over to the next analysis. The instrument blank shall consist of high purity solvent (e.g. hexane for pesticide analysis by GC/ECD, methylene chloride for semi-volatiles analysis by GC/MS).
- 11.2.6 An Initial Calibration Blank (ICB) is analyzed before sample analysis begins to verify there is no carryover contamination or instrument drift. ICB samples usually accompany inorganic instrumental analysis.
- 11.2.7 The analysis of sample duplicates that contain detectable quantities of analytes is an effective means for assessing the precision of an analysis. Refer to the individual analytical procedures or LIMS test codes for guidance concerning the frequency and criteria for sample duplicate analyses.



## 11.3 Inter-laboratory Quality Control

Each section of the laboratory may be given blind and double blind samples to analyze for requested parameters. Blind samples may be assigned in containers to be diluted, digested, and/or extracted and analyzed by the appropriate laboratory section. Double-blind samples may arrive on a pre-scheduled basis from a “client” as real samples to be analyzed by designated analytical sections for specific analytes.

### 11.3.1 Blind QC Samples

Blind QC samples may be used as a test of proficiency for analysts needing certification and/or qualification for performing an analysis. The Section Supervisor should obtain the QC sample from either the Quality Assurance Department or from a source independent from the source of standards for the analysis.

### 11.3.2 Double - Blind QC Samples

Quality Control samples may arrive from a “Client” to be analyzed for specific analytes. These samples will arrive as real samples and will not be known to anyone outside Quality Assurance and Project Management. The results of these double-blind samples will be sent to the “client” to be compared to the true value of the samples. The laboratory’s performance on these samples will be compared to other laboratories in the program. These results will be mailed to the Quality Assurance Department. Results are used to identify areas needing improvement.

## 11.4 Out-of-Control Conditions in Laboratory Control Samples

### 11.4.1 Any of the following control chart conditions indicates the loss of process control:

- 11.4.1.1 Any one point that is outside of the control limits.
- 11.4.1.2 Any three consecutive points that are outside one of the warning limits.
- 11.4.1.3 Any eight consecutive points on the same side of the centerline.
- 11.4.1.4 Any obvious cyclic or repetitive pattern seen in the points.

### 11.4.2 Reactions to “Out-of-Control” Conditions

In the event of an “out-of-control” condition, analyst should respond to the condition as follows:

- 11.4.2.1 Stop analysis.
- 11.4.2.2 Investigate the root cause of the failure
- 11.4.2.3 Implement any required corrective action.
- 11.4.2.4 Document the situation in a non-conformance memo prior to initiating subsequent analyses.

## 11.5 Identification of Analytes

### 11.5.1 Organic Analyses

The identification of analytes is accomplished by comparison of unknown samples with known standards. All standards shall be traceable as specified by the applicable analytical procedure.

#### 11.5.1.1 Gas Chromatography

All sample identifications are made by a comparison of the retention time of the standard peak to the retention time of the unknown peak. The identification of any analyte, which is identified during the primary analysis, is verified through the use of a confirmation column or by GC/MS unless specifically exempted in the applicable procedure.

#### 11.5.1.2 Gas Chromatography/Mass Spectrometry (GC/MS)

For positive identification of an analyte by GC/MS, the spectrum of the analyte must conform to a spectrum of the authentic standard obtained after satisfactory tuning of the mass

spectrometer. The appropriate analytical methods should be consulted for specific criteria for matching the mass spectra, relative response factors and relative retention times to those of authentic standards. Tentative identifications may be made based on conformance to published mass spectra in reference texts or spectral library databases.

## 11.5.2 Inorganic Analyses

The identification of analytes is accomplished by comparison of unknown samples with known standards. All standards shall be traceable as specified by the applicable analytical procedure.

### 11.5.2.1 Metals

The concentration of a metal analyte is based on the absorption or emission of light measured at a specific wavelength. The wavelength selected is in accordance with the applicable procedure. Standards used to generate the calibration curve are traceable to NIST or other nationally recognized (e.g. EPA).

### 11.5.2.2 Wet Chemistry

Standards used to prepare calibration curves or to standardize instruments are traceable to NIST or other national sources (e.g. EPA).

## 11.6 Quantitation and Reporting of Analytes

### 11.6.1 Reduction of Sample Data

Data reduction is defined as the processing of instrument generated numbers by an analyst to achieve a final result. Data reduction is used for sample analysis as well as for quality control criteria.

Processing of numbers may be achieved using manual and/or computer aided calculations.

11.6.1.1 All data reduction follows calculations found in approved procedures for the analysis.

11.6.1.2 An analyst who is qualified to perform the analysis performs all data reduction. If a Section Supervisor performs data reduction, another qualified analyst reviews the data.

11.6.1.3 All numbers used in the reduction of data are present on data reports and are easily retrievable.

11.6.1.4 All computer-generated calculations are performed using a validated program/spreadsheet.

## 11.7 Reporting Data

### 11.7.1 Significant Digits

All digits in a reported result are considered to be definite, except for the last digit, which may be in doubt. Such a number is said to contain only significant figures. If more than a single doubtful digit is carried, the extra digit or digits are not significant. The following rules apply to all reported analytical results from all laboratory sections:

11.7.1.1 All digits from a measurement are recorded. These numbers are used in the calculation of the results. After all calculations have been performed, the number is rounded to the required number of significant digits.

11.7.1.2 The number zero may or may not be a significant digit, depending on placement of the decimal.

11.7.1.3 Final zeroes, after a decimal, are always significant (Ex. 9.80 has three significant figures).

11.7.1.4 Zeroes before a decimal point with non-zero digits preceding them are significant. Zeroes with no non-zero digits before them are not significant (e.g. 10.3 has three significant digits, 0.53 has two significant digits).

11.7.1.5 If there are no non-zero digits preceding a decimal point, the zeroes after the decimal point but preceding other non-zero digits are not significant. These zeroes only indicate the position of the decimal point.

11.7.1.6 The final zero in a whole number may or may not be significant.

11.7.1.7 When mathematical functions are performed on multiple numbers, the number with the least number of significant digits dictates how many significant digits the end result should have.

#### 11.7.2 Rounding Rules

11.7.2.1 Once the number of significant figures obtainable from a particular analysis is established, data resulting from the analysis are reduced according to the standard rules for rounding which state: If the number value to be rounded is 5 or greater, round up. If the number value is less than 5, round down.

11.7.2.2 Rounding off numbers is a necessary operation in all analytical sections of the laboratory. It is automatically applied by the limits of measurement of every instrument and all glassware.

#### 11.7.3 Reporting Units

The appropriate unit of measurement shall accompany all sample results reports.

#### 11.7.4 Reporting on a Wet vs. Dry Weight Basis

When required, solid sample results are reported on a dry weight basis and documented in the report. When results are reported on a wet weight basis, the results are reported "as is".

#### 11.7.5 Reporting % Recovery and RPD

Unless otherwise directed by the customer, the Technical Director, or the QA Manager, the % Recovery and RPD are reported to one decimal place.

### 11.8 Storage of Quality Related Data

The laboratory retains all data and information that pertains to a project for a period of 5 years. The data may be stored electronically, as hard copy, or both.

#### 11.8.1 Calibration Data

All calibration data, which pertains to a specific project, is stored in an easily retrievable manner. Easily retrievable manner is defined as retrievable in the same day for current projects, or within 24 hours for archived projects.

#### 11.8.2 Quality Control Data

All quality control related data (i.e. blanks, blank spikes/duplicates, matrix spikes/duplicates, etc.) is stored in the associated project file. If more than one project is associated with the QC data, copies are made and stored with each associated project.

#### 11.8.3 Logbooks (Notebooks)

Laboratory logbooks are kept in the laboratory while in use. Once completed, the logbooks are archived in an easily retrievable location.

#### 11.8.4 QC Charts

While in use, QC charts are stored in LIMS. When the QC Chart is no longer being used, it is archived by the section in a central location in the Server.

### 11.9 Internal Performance Audits

Internal performance audits are a means for the Quality Assurance Department to determine the applicability, effectiveness, and utilization of procedures by all sections. Designated personnel perform the performance audits. At the beginning of each year, and on an on-going basis, a schedule of audits and surveillance is developed and updated by the Quality Assurance Section. Surveillance is performed on an unannounced basis with the sections so that objectivity may be maintained. Findings from audits

and surveillance are documented and corrective actions are implemented. Additional surveillance is scheduled to ensure that all deficiencies are corrected.

### 11.10 Failure of Quality Control Indicators

When there is a quality control failure that impacts data quality, the event must be documented using the procedures described in Section 13 of this document.

## 12.0 DATA REDUCTION, REVIEW AND REPORTING

12.1 Introduction: In order to provide the highest quality data possible, an extensive system for data reduction, review, and reporting has been implemented.

### 12.2 Sample Analysis and Data Reduction

Through the use of the worksheets, the samples are prepared following the procedures given in each of the SOPs that follow EPA's approved methods. The preparation information is recorded in logbooks throughout the laboratory.

#### 12.2.1 Data Reduction

Most sample concentration results are read directly from instrumentation without further reduction or calculations. Dilution factors are applied upon the dilution of samples having concentrations above the calibration range. In many cases, these are put into the computer and correct results are calculated automatically. In other cases, a manual calculation may be made. Data from methods requiring manual reduction prior to reporting include titrimetric methods, BOD, COD, conductivity, manual UV/VIS/IR and residue. All laboratory pH meters are temperature compensated.

The laboratory raw data containing the instrument-generated reports, manually calculated results, and all supporting preparation, calibration, and analytical data are scanned as pdf file and posted in laboratory archives (portal server).

#### 12.2.2 Chromatographic and Data File Identification

Chromatograms and data files are given a unique alphanumeric identification by the chemists initiating the analyses in each section. These file identification numbers reflect either the date the sequence was initiated (GC sections), the order in which samples were analyzed (GC/MS sections), and/or the sample identification and log numbers given by the client and listed on the LIMS.

### 12.3 Data Transfer and Review

#### 12.3.1 Data Transfer to LIMS

The analytical results are entered on the department worksheets after review or by direct electronic transfer from the instrument data system. The analysts enter the worksheet data into the LIMS. After the data is entered into the LIMS, approval sheets are printed and checked against the information entered into the LIMS for transcription errors and anomalies.

#### 12.3.2 Data Review

Laboratory analytical results are reviewed by at least two analysts or a section supervisor prior to entering the reportable data into the LIMS. The review of the data includes checking the extraction, digestion, distillation, and other preparation logs, ensuring that all precision and accuracy requirements are addressed, and ensuring that all steps of the analyses have been completed. If any problems were indicated during the analysis of the sample batch, it is the responsibility of the analyst and the section supervisor to bring this to the attention of the project manager, section manager and QA manager through a written corrective action report.

## 12.3.3 Data flags

Data flags are used on reports as needed to inform the project manager and the client of any additional information that might aid in the interpretation of the data. The data flagging system incorporates data qualifiers which are similar to flags specified in the Contract Laboratory Program protocols, as well as additional flags used to help explain batch specific events.

## 12.3.4 Final Report

When data acquisition and reporting have been completed, the project manager reviews and prepares the final report. Because the project managers have extensive experience in evaluating analytical data, they have developed both objective and subjective techniques for data review. Each value reported is reviewed in the context of the respective environmental matrix and all available QC/QA data.

Final Reports shall include the following:

- Title (e.g. Transmission Electron Microscopy Analysis Report)
- Name and address of the laboratory
- Unique identifying number
- Name and contact information of the customer
- Identification of the method used
- Sample description and if necessary, condition of it
- Date of sampling and receipt
- Date the test was performed
- Date report was issued
- A statement that the results relate only to the items tested as received
- Units of measure, where appropriate
- Deviations from the method
- Reports from Subcontract Laboratories included as they were received

The laboratory is responsible for information provided in the report, except when information is provided by the customer. Data provided by the customer will be clearly identified. A narrative will be added to the report information supplied by the customer can affect the validity of the results.

12.3.4.1 The QA Manager will periodically review test reports in compliance to AIHA LAP LQSR prior to issuance and document this review via a tracking spreadsheet and by adding a comment to the work order.

12.3.4.2 Abnormal values are carefully scrutinized, and samples are reanalyzed if the abnormalities cannot be explained.

12.3.4.3 If the results from spiked samples suggest interferences (low or high bias), attempts are made to remove the interferences, or the data is flagged and/or a project narrative is included with the report. Laboratory qualifiers are defined as follows:

- \* - Value exceeds maximum contaminant level
- B - Analyte detected in the associated method blank
- BRL - Below Reporting Limit
- E - Estimated (Value reported above quantitation range)
- H - Holding times for preparation or analysis exceeded
- J - Estimated value detected below Reporting Limit
- N - Analyte not NELAC (TNI) certified
- Narr - See Case Narrative
- NC - Not Confirmed
- R - RPD outside accepted recovery limits



Rpt Lim - Reporting Limit

S - Spike recovery outside accepted recovery limits

> - Greater than Result value

< - Less than Result value

12.3.4.3 Clients are instructed to provide sufficient sample for the analysis of Matrix Spike and Matrix Spike Duplicate analysis, however there are times when the laboratory does not receive sufficient aqueous sample volume to perform these analyses. If an aqueous sample batch is analyzed without the inclusion of a spike/spike duplicate sample(s), this fact is added to the report narrative per TNI requirements. Example verbiage is as follows:

*The TNI requirement for the analysis of a matrix spike/matrix spike duplicate could not be performed on Batch (#) due to insufficient sample volume submitted.*

### 12.4 Special Project or Data Package Review

If the client requests special handling and/or data packages, the Laboratory Director, Technical Director, or Quality Assurance Manager may also review the project report and the raw data. This review includes checking holding time requirements and calibrations, reviewing all quality control data and/or control charts, and initiating any corrective actions or re-analyses that might be appropriate.

### 12.5 Quality Control Reports

EETSE Atlanta, Inc. offers four levels of quality control reporting. Each level contains all the information provided in the preceding level, in addition to its own specific requirements. The quality control packages provide data in the following levels:

12.5.1 Level I - method references, preparation and analysis dates, surrogate(s) recoveries and reporting limits.

12.5.2 Level II - Level I information plus results for the blank, LCS and MS/MSD and sample duplicates.

12.5.3 Level III - Level I and II information plus all raw data associated with sample preparation, instrument calibration (if applicable) and sample analysis.

12.5.4 Level IV - Level I, II and III information in a CLP "look-alike" format, and all sample raw data.

### 12.6 Reporting Criteria

The final report is printed and signed by the Laboratory Manager, the Director of Project Management or a Project Manager after all review has been completed. The Laboratory Manager, the Director of Project Management and Project Managers serve as designees for technical director for report signing. The data flags that may appear in a project report are defined and any additional comments are included in the Case Narrative.

12.6.1 If requested by the client or a project specific QA Plan, custom reports or data packages can be provided. When data packaging is requested, a paginated data package is provided in addition to the project report. The format of the project report and/or data package can be adjusted to meet the needs of the client. All LIMS reports can be downloaded onto diskettes or to most clients' computers.

12.6.2 When the project report must meet TNI requirements, the report will include a certification statement indicating the results meet TNI standards, an estimated uncertainty statement, and a format that includes the total number of pages in the report.

12.6.3 EETSE Atlanta, Inc., will not intentionally divulge to any person (other than a client or person designated by a client in writing) any information regarding the services provided by EETSE Atlanta or any information disclosed to EETSE Atlanta by the client **unless required by law or authorized contractual arrangement. In these instances, the client will be notified unless prohibited by law.** Any



information *known* to be potentially endangering to national security or any entity's proprietary rights will NOT be released.

- 12.6.3 Test results are reported according to client requirements. If a client requests to have reports or information sent by fax, the client is notified in advance of the transmission, whenever possible, and all documents include a cover sheet with the following statement:

### NOTICE OF CONFIDENTIALITY

*The information contained in this facsimile message may be legally privileged and is confidential information intended only for the use of the individual or entity named above. If the reader of this message is not the intended recipient, you are hereby notified that any use, dissemination, distribution or copy of this facsimile message is strictly prohibited. If you have received this facsimile message in error, please contact us by telephone at (770) 457-8177 and return the facsimile message to us at the address above via the US postal service.*

All documents sent by email should include the following statement:

*NOTICE OF CONFIDENTIALITY: The information in this email and / or attachments may be legally privileged and is confidential information intended for the use of the individual or entity named in the email address. If the reader of this message is not the intended recipient, you are hereby notified that any use, dissemination, distribution, or copy of this email and / or attachments is strictly prohibited. If you have received this email in error, please notify EETSE Atlanta Customer Service by telephone at (770) 457-8177 or delete the message. Thank you.*

## 12.7 Record Keeping

Procedures are in place to ensure that all records required under TNI Chapter 5 and AIHA LAP program requirements are retained. The laboratory maintains a record keeping system that can produce unequivocal, accurate records that document all laboratory activities.

- 12.7.1 When an analytical batch is prepped and analyzed, the analyst enters the data into the LIMS system and gives the raw data, quality control data and a copy of the prep log (if applicable) to the department manager to review.
- 12.7.2 Any problems encountered during sample preparation and analysis are corrected and brought to the attention 12.8.1 Sample Preparation, E of the department manager.
- 12.7.3 After department manager review, data is validated in the LIMS system for reporting to the client.

## 12.8 Records of Analysis

### 12.8.1 Sample Preparation, Extraction, Distillation, and Digestion

All steps of the preparation, extraction, distillation and/or digestion of samples are thoroughly documented. Documentation is determined by the QA Manager, Laboratory Manager, and the Technical Director and includes (if applicable):

- 12.8.1.1 Standard Identification
- 12.8.1.2 Dilution Factors
- 12.8.1.3 Sample Identification
- 12.8.1.4 Reagent Identification
- 12.8.1.5 Date the extraction, digestion, and or analysis was performed
- 12.8.1.6 Initials of the analysts performing the digestion, extraction, and or analysis
- 12.8.1.7 Volume/weight of sample used

12.8.1.8 Final volumes/weights

12.8.1.9 Initial and final review signatures, where required

12.8.1.10 Instruments used

## 12.8.2 Preparation of Standards and Reagents

12.8.2.1 The preparation of all standards and reagents are documented. The lot numbers of all standards associated with a particular project are traceable either through the instrument logbook, a QC check list, a worksheet, or another approved document.

12.8.2.2 Original vendor Certificates of Analysis are distributed by the Shipping and Receiving Office to the intended departments.

## 12.9 Standard and Reagent Traceability

Standards and reagents are tracked in the LIMS chemical inventory system for traceability and auditing purposes. The method of standard and reagent tracking is outlined in the subsequent sections.

12.9.1 When a standard/reagent is needed that is not already on the approved vendor/materials order list, supervisors forward purchase requests to the Technical Director and/or Laboratory Manager for approval. The standard/reagent is ordered from a reputable vendor (EETSE Atlanta typically uses VWR). The laboratory attempts to use certified reference materials from providers who conform to ISO Guide 34.

12.9.2 The information supplied to the Technical Director and / or Laboratory Manager must have the supplier standard or reagent name, order number, size or amount of each unit, grade or purity, price, if possible, and quantity. Upon receipt, supplies (and services) are reviewed to ensure they comply with requirements. When a vendor has been approved for services, a note is placed in the comments field of the Vendors database within LIMS.

12.9.3 When the standard or reagent arrives, it is logged into the LIMS, usually by the department supervisor or by the sample custodian. All reagents and standards received are electronically tracked and documented by computer via the Laboratory Information Management System.

12.9.4 Each standard or reagent is given a unique chemical inventory number upon receipt. The next available number in the LIMS is automatically assigned, starting with #5001. The computer entry is completed by entering the correct information in the required fields.

12.9.4.1 The expiration date for neat standards and reagents is determined using the manufacturer's expiration date, if available. Otherwise, a 1 year expiration date is assigned to volatile organic compounds and standards and 5 year date for acids, dry chemicals, solvents, reagents, and other chemicals. Each standard and reagent is clearly and permanently labeled with its expiration date in indelible ink. The assigned expiration date for intermediate standards will not exceed the manufacturer's expiration date of the stock standard.

12.9.4.2 Secondary standard containers are labeled with the corresponding LIMS tracking number of the source material, the date the contents were prepared, the six month expiration date, the name of the analyte(s), the concentration of each component of the solution, the matrix and the initials of the person who prepared it.

12.9.4.3 The chemical inventory number must appear on both the standard and reagent container, and the upper, right-hand corner of the certificate of analysis. It must also be included, if applicable, in standard/preparation, analyses or sample preparation log books.

12.9.4.4 Secondary standard labels include the LIMS chemical inventory number, the standard name, intended use (spiking, surrogate, reference or calibration solution), and concentration with units, expiration date and initials of the person who prepared it. As long as this is available, all other information can be found in the LIMS.

12.9.5 Spiking, surrogate, reference and calibration solutions and calculations are recorded in the appropriate "Standard/Preparation Log Book." Logbooks cover the following areas: Organics, Organics Preparation, Semi-Volatile Organics, Microbiology, Metals, Mercury & Wet Chemistry.

12.9.6 Some containers such as standards containers for organics are small and there may not be enough room to list all of the required information on the container. Should this occur, it is permissible to attach a label to the bottle.

12.9.7 When a standard or reagent is added to a sample for any reason, the LIMS chemical inventory number of that standard or reagent and the amount added must be recorded in the appropriate logbook. For example, if a stock standard MET #33-89-5431 of 1000 mg/L is diluted to 100 µg/L, the following line is entered: 1 ml MET #33-89-5431 to 100 ml DI water, 1 ml of 100x to 100 ml DI water, final conc. = 100 µg/L. (NOTE: "MET #33-89-5431" = Metals Department Standard/Preparation Log Book 33, page 89, LIMS Chemical Inventory Number 5431).

12.9.8 If the standard is used as a stock standard and aliquots of it are diluted to produce working standards, the stock standard's LIMS chemical inventory number is used. The standard concentration or a designator such as "1" or "A" is used to differentiate between each serial dilution.

## 12.10 Standard Verification

### 12.10.1 Certificates of Analysis

12.10.3.1 Each department is responsible for maintaining all certificates of analysis received with its standards and reagents. The LIMS-assigned chemical inventory number is written in the upper, right-hand corner of each COA. The certificates are maintained on the portal server. The certificates are held for a minimum of five years.

12.10.3.2 Most accrediting authorities require that a certificate of analysis is kept on file for all standards used in the laboratory. If at all possible, a certificate for reagents should also be obtained. This documentation serves two purposes; 1) it gives further traceability for the standard or reagent, and 2) it provides a manufacturer's guarantee that the standard is comprised of the compounds at the levels listed.

## 12.11 Estimation of Uncertainty (for AIHA LAP accreditation)

Estimation of Uncertainty is the parameter associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurement. A reasonable 'Estimation of Uncertainty' shall be based on knowledge of the performance of the method and on the measurement scope and shall make use of, for example, previous experience and validation data. It is monitored by the monthly checks, proficiency exam results and error rates. The estimate of day-to-day precision is determined by comparison of duplicate samples (or matrix spike duplicates). Results of the two analyses are compared by their relative percent difference, RPD:  $(A-B) / (\text{Average of A and B})$ .

Estimation of Uncertainty Limits may be method / program specified (e.g. AIHA LAP ELLAP) or based on historical laboratory limits. Interim limits are used until enough data points have been generated to set representative limits. The actual limits are calculated annually and are posted on the portal server.

Estimation of Uncertainty Policy follows the AIHA LAP Accreditation Program requirements with respect to the [measurement uncertainty](#) for tests associated with their scope of accreditation. The requirement which underlies this policy is found in ISO/IEC 17025:2017, Section 7.6).

### AIHA LAP Uncertainty and Uncertainty Limits Determinations

The Measurement Uncertainty is the result of the evaluation aimed at characterizing the range within which the true value of a test result is estimated to lie, generally within a given likelihood. Non-negative parameter characterizing the dispersion of the quantity values being attributed to the measurand, based on the information used.

#### 12.11.1 Definitions of Terms used by the laboratory

Bias is the total systematic error manifested as a consistent positive or negative deviation from the true value.

Measurand is the quantity intended to be measured or analyte concentration.

Precision is the closeness of agreement between measured quantity values obtained by replicate measurements under the same conditions. Precision is commonly expressed as standard deviation or relative percent difference and can be evaluated by the analysis of duplicate samples or duplicate sampling media spikes.

Type A evaluation of measurement uncertainty: Evaluation of a component of measurement uncertainty by a statistical analysis of measured quantity values obtained under defined measurement conditions. This approach uses existing data from routine laboratory quality control samples such as certified reference material, laboratory control samples, duplicates, or data from method validation studies and proficiency testing (PT) study results.

Type B evaluation of measurement uncertainty: Evaluation of a component of measurement uncertainty determined by means other than a Type A. This approach involves the estimation and compilation of individual uncertainties for each contributing measurement.

Contributors to consider for measurement uncertainty are listed in Table 12-1.

#### 12.11.2 The laboratory utilizes Type A approach for the Estimation of Uncertainty. One or more of the following options are utilized:

12.11.2.1 Uncertainty specified within a standard method. In those cases where well recognized test method (such as NIOSH, OSHA, etc. method), specifies limits to the values of the major sources of [measurement uncertainty](#) and specifies the form of presentation of calculated results, laboratories need not do anything more than to follow the reporting instructions as long as they can demonstrate they follow the reference method without modification and can meet specified reliability.

12.11.2.2 Laboratory Control Samples (LCS) and Matrix Spikes. In cases where matrix specific LCS (CRM or media spikes) and/or matrix spike data are available, include uncertainty estimated from the standard deviation of long term data collected from routine sample runs for existing test methods or from the standard deviation of the LCS or matrix spike data for method validation/verification studies for new test methods.

12.11.2.3 Duplicate Data. In cases where sub-sampling occurs and there are data over the reporting limit, include uncertainty estimated from long term duplicate data collected from routine sample runs for existing test methods or method validation/verification studies for new test methods.

12.11.2.4 Proficiency Testing (PT) Sample Data. In cases where the previous options are not available and where PT samples are analyzed with sufficient data above the reporting limit, pooled PT sample data can be used to estimate uncertainty.

12.11.3 Uncertainty determinations specific to each type of testing for AIHA LAP is as follows:

12.11.3.1 Industrial Hygiene Chemical/Gravimetric Analysis.

The laboratory uses the Type A approach to Measurement Uncertainty. Acceptance limits are determined using historical LCS (CRM or media spikes) data for each procedure/target analyte. Once at least twenty values are available, the mean and standard deviation of the data set are calculated. Bias is noted and available for reporting. The data is evaluated for outliers using standard Grubbs Outlier calculations with statistical outliers omitted. Control limits are set at  $\pm 3$  standard deviation and for measurement uncertainty  $k=2$ , or  $\pm 2$  standard deviation are used.

Where target analyte spiking is not applicable such as for gravimetric testing, only precision limits are used for uncertainty determinations. If less than 50 points are available for calculation, the limits are considered interim limits.

12.11.3.2 Industrial Hygiene Asbestos by PCM Analysis. Ranges of uncertainty for IH asbestos by PCM testing are determined for precision only using daily reference slide and blind recount analyses as described below.

12.11.3.2.1 The laboratory's set of reference slides includes slides from previous PAT rounds, Round Robins and field samples. The laboratory acceptance limits are determined from data accumulated from blind recounts of these reference slides and established at 95% confidence limits. From blind repeat counts of reference slides, Sr values obtained for 3 following ranges: 5-20 fibers in 100 graticule fields; 20.5-50 fibers in 100 graticule fields; 50.5-100 fibers in 100 graticule fields.

12.11.3.3 Environmental Lead Analysis under the ELLAP Program: Ranges for uncertainty for ELLAP testing for precision and accuracy are determined by the laboratory. Monitoring of method performance and bias is accomplished using statistical process control (charts or database) for monitoring EETSE Atlanta laboratory performance with QC sample analysis (LCS/LCSD, MS/MSD). SOPs (Sec. 13) for Lead in Paint, Lead in Wipes, Lead in Soil (SW 7000D), and Lead in Airborne Dust describe the required minimum performance criteria for QC sample analysis and the method performance for the laboratory. Method performance and bias are evaluated on an annual basis by the QA Manager. If the calculated limits are **outside those listed in Table 3 of the current LQSR, an evaluation of them will be performed. All monitoring data in the form of control charts are maintained/posted to the portal server, the laboratory's archival system.**

12.11.3.4 Quantifiable Fungal Analysis for reporting under the EMLAP Program. Ranges for uncertainty for quantifiable fungal testing are determined for precision only. Duplicate samples are counted for at least 5% of samples for inter-analyst precision monitoring and replicates samples are counted by different analysts for intra-analyst precision monitoring. Uncertainty ranges are determined using the mean of the range of the logarithm of each count obtained from a minimum of 20 duplicate/replicate pairs. This mean value is multiplied by 3.27 to obtain the final control limit. Once the control limit is determined, the logarithmic range for each ongoing duplicate/replicate pair is determined and must be  $<$  control limit value. Specific information used for control limits for each individual EMLAP test method are provided in Table 5-1.



The lab determines **measurement uncertainty** associated with Spore Trap Analysis by using the Type (A) methodology. QC reference slides are used that have varying spore count levels. 30 data points are used for each QC slide. From these counts the Mean and Standard Deviation are determined. Then the Coefficient of Variation (CV) is calculated for each set of data by dividing the standard deviation by the mean. Then the pooled CV is calculated by adding the squares of the CV values, averaging them and taking the square root. The expanded **Measurement Uncertainty** (MU) is calculated by multiplying the pooled CV value by the appropriate coverage factor k. For a confidence level of 95%, k is approximately 2 for a data set of 30 points or more. This RSD value is then multiplied by the calculated or observed value of the sample to be expressed as a **measurement uncertainty**. When reporting results for expanded Measure of uncertainty the test results and the expanded **measurement uncertainty** are expressed in the same units.

Example with a calculated CV pooled of 0.114:

Expanded MU @ 95% C.L. (k=2) equals CV *pooled* (.114) X 2 = 0.23 (23% RSD)

Bias cannot be determined. No quantitative reference material available

Example analytical uncertainty for air sample with 500 spores/m<sup>3</sup>:

Expanded analytical uncertainty = 500 spores/m<sup>3</sup> X 0.23 = 115 spores/m<sup>3</sup>

Example of reporting for air sample with 500 spores/m<sup>3</sup>:

500 spores/m<sup>3</sup> with an analytical uncertainty of +/- 115 spores/m<sup>3</sup> at the 95% confidence level

12.11.3.5 Qualitative Fungal Analysis for reporting under the EMLAP Program. In order to monitor consistency with regard to genus/species identification, acceptability criteria for taxon identification and taxon abundance ranking are described below. These are laboratory determined; interim criteria as no regulatory guidance or method specified criteria are available.

12.11.3.5.1 Taxon identification acceptability: On the replicate and duplicate analyses, daily reference slide analyses, monthly reference culture analyses and round robin study analyses with at least 3 different organisms present, 60% of all genus/species of fungi and/or genus/group of fungi identified on the original sample at levels >10x LOD should also be identified on the recount.

12.11.3.5.2 Taxon abundance ranking acceptability: On the replicate and duplicate analyses, daily reference slide analyses and round robin study analyses, the top three genus/species of fungi and/or genus/group of fungi by abundance and >10x LOD will be ranked. The recount data should identify these same fungi for the identification to be considered acceptable.

12.11.3.5.3 Consistent fungal ID is also monitored through participation in the Direct Exam Fungal Analysis PT programs administered by EMLAP. Acceptability limits are currently set at 85% correct identification by AIHA LAP.

12.11.3.5.4 It should also be recognized that other, non-quantifiable factors may also add additional uncertainty. These factors may include media selection, organism competition, etc. and are not directly measurable.

12.11.4 The reporting procedure.

Typically, measurement uncertainty is reported per the client's request or when the *known compliance* to a specification limit is affected. The result and the expanded measurement uncertainty are reported in the same units. Both the result and expanded measurement uncertainty will be rounded to the same number of significant figures.



#### 12.11.4.1 Reporting test results the Expanded Measurement Uncertainty

When the reporting of uncertainty is required or requested by a client to be included in the analytical report, the test result and the expanded measurement uncertainty will be reported in the same units. The test result and the expanded measurement uncertainty should both be rounded in a similar manner, meaning the same number of significant figures.

A description of the coverage factor should be included as in the following example:

Total Lead in Air concentration of 50 ug/sample  $\pm 5.3$  ug/sample at 95% confidence level (k=2)

Where bias is present, report it along with the uncertainty as a probable bias such as:

Total Lead in Air concentration of 50 ug/sample  $\pm 5.3$  ug/sample at 95% confidence level (k=2)

This method has an average recovery of 99 %, or a probable bias of -0.5 ug/sample.

An example template for the expanded measurement uncertainty calculation is in Table 12-2.

Table 12-1 Contributors to Measurement Uncertainty (Applicable AIHA LAP methods SW700B, N7082, N7300, and N7303)

Example of Contributors to Measurement Uncertainty Chemical Analyses of Lead (Pb) using ICP-EETSE Atlanta and FAA See Example Calculations (to the right of the table)

| Contributors to Uncertainty                       | Representative and Applicable QC Data | Comments to Clarify Contributor Effects                                                                                 |
|---------------------------------------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Transportation/Storage/Handling</b>            |                                       |                                                                                                                         |
| shipping time, container & temperature            | NA                                    | No impact on bulk paint samples from transportation, storage or normal handling                                         |
| lab storage time, conditions & temperature        | NA                                    |                                                                                                                         |
| contamination in lab storage areas                | NA                                    |                                                                                                                         |
| <b>Laboratory Subsampling</b>                     |                                       |                                                                                                                         |
| sample nonhomogeneity                             | DUP                                   | Sample composition, etc.                                                                                                |
| blending techniques                               | DUP                                   | Stirring, sieving, grinding, etc.                                                                                       |
| sample size                                       | DUP                                   | Large enough to allow adequate subsampling                                                                              |
| <b>Sample Preparation:</b>                        |                                       |                                                                                                                         |
| volumetric glassware                              | LCS, DUP                              | NA for Class A; applies for graduated tubes or cylinders, etc.                                                          |
| dispensing device                                 | LCS, DUP                              | pipettes, and other types of dispensers not Class A                                                                     |
| balance                                           | LCS, DUP                              | balance error is often insignificant compared to other MU sources                                                       |
| temperature                                       | LCS, DUP                              | Hot plate or ashing temperatures                                                                                        |
| sample extraction                                 | LCS, DUP                              | Applies to LCS or DUP if goes through sample preparation                                                                |
| extractant background                             | LCS, DUP, MB                          | Analyte or interferant in acids, or other reagents                                                                      |
| <b>Lab Environmental Conditions:</b>              |                                       |                                                                                                                         |
| temperature variance                              | NA                                    | No impact on bulk paint samples                                                                                         |
| humidity variance                                 | NA                                    | No impact on bulk paint samples                                                                                         |
| <b>Analysts:</b>                                  |                                       |                                                                                                                         |
| different analysts                                | LCS, DUP                              | Analyst contributors affect all aspects of analysis from subsampling through data manipulation                          |
| analyst training level & experience               | LCS, DUP                              |                                                                                                                         |
| data interpretation by analyst                    | LCS, DUP                              |                                                                                                                         |
| <b>Measuring Instruments:</b>                     |                                       |                                                                                                                         |
| instrument stability                              | LCS                                   | Baseline drift, repeatability of averaged readings, etc.                                                                |
| carry over effects                                | LCS, DUP                              | Impact of high samples on following sample readings; can be monitored by proper use of CCBs                             |
| day to day calibration differences                | LCS                                   |                                                                                                                         |
| interferences                                     | DUP, MS                               | Due to matrix, inter-element effects, etc. Cannot be routinely determined for typical industrial hygiene sampling media |
| <b>Calibration Standards/Reference Materials:</b> |                                       |                                                                                                                         |
| preparation variances                             | LCS, DUP                              | Due to analysts, balances, dispensing devices used, etc.                                                                |
| calibration stock material uncertainty            | CERTIFICATE                           | Obtain from certificate or estimate                                                                                     |
| LCS reference material uncertainty                | NA                                    | Sample results not corrected for LCS recovery                                                                           |

| Test Procedure Variations                                         |     |                                                                              |
|-------------------------------------------------------------------|-----|------------------------------------------------------------------------------|
| variation within and between reagent lots                         | LCS | Similar to extractant background effects under Sample Preparation above      |
| extraction or digestion times and temps                           | LCS | May affect complete dissolution of analyte or loss of material in some cases |
| sample dependent modifications                                    | LCS | Changes in conditions due to sample size, customer requests, etc             |
| desorption efficiencies within and between lots for sorbent tubes | NA  |                                                                              |
| Data Manipulation:                                                |     |                                                                              |
| sampling media blank correction                                   | NA  | No sampling media with bulk samples                                          |
| instrument blank correction                                       | LCS | when allowed                                                                 |
| Accuracy of calculations                                          | LCS | Manual, spreadsheet, LIMS, etc                                               |

DUP = Duplicate, resulting from sub-sampling of a bulk (NOTE: NOT LCS/LCSD duplicate spiked sampling media)

FB = Field Blank

FS = Field Spike

LCS = Laboratory Control Sample, matrix matched and typically taken through the entire analytical process, with each sample batch

MB = Method or matrix blank

NA = Not Applicable

Table 12-1 Contributors to Measurement Uncertainty (AIHA LAP, LLC methods Air SOPs MB-15019, MB-15022, MB-15028; Bulk SOPs MB-15020; and Surface Direct (SOP MB-15020) Exam

**Example Contributors to Measurement Uncertainty – Direct Air Environmental Microbiology Analyses**  
(representative list - may not include of all contributors)  
(QC sample types in this list are typical of those utilized in AIHA LAP laboratories)  
See Example Calculations (to the right of the table) and tabbed sheets for additional examples

| Contributors to Uncertainty                     | Representative and Applicable QC Data | Comments to Clarify Contributor Effects                                                                                                                                                       |
|-------------------------------------------------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Temperature, Storage, Handling:</b>          |                                       |                                                                                                                                                                                               |
| shipping time, container & temperature          | NA                                    | No impact on direct air exam samples                                                                                                                                                          |
| lab storage time, conditions & temperature      | NA                                    | No impact on direct air exam samples                                                                                                                                                          |
| contamination in lab storage areas              | NA                                    | No impact on direct air exam samples                                                                                                                                                          |
| <b>Laboratory Subsampling:</b>                  |                                       |                                                                                                                                                                                               |
| sample nonhomogeneity                           | NA                                    | Not applicable to direct air exam samples                                                                                                                                                     |
| blending techniques                             | NA                                    | Not applicable to direct air exam samples                                                                                                                                                     |
| sample size                                     | NA                                    | Not applicable to direct air exam samples                                                                                                                                                     |
| <b>Sample Preparation:</b>                      |                                       |                                                                                                                                                                                               |
| slides & coverslip contamination                | MB                                    | With proper care there should be no contamination of daily blanks; therefore, no impact                                                                                                       |
| mounting medium                                 | MB                                    | With proper care there should be no contamination of daily blanks; therefore, no impact                                                                                                       |
| <b>Lab Environmental Conditions:</b>            |                                       |                                                                                                                                                                                               |
| seasonal background spore variances             | MB                                    | Samples are not exposed to air for any length of time; therefore there should be no impact                                                                                                    |
| <b>Analysts:</b>                                |                                       |                                                                                                                                                                                               |
| different analysts                              | RS                                    | Reference slides analyzed by multiple analysts                                                                                                                                                |
| analyst training level & experience             | RS                                    | Reference slides analyzed by multiple analysts                                                                                                                                                |
| data interpretation by analyst                  | RS                                    | Reference slides analyzed by multiple analysts                                                                                                                                                |
| <b>Measuring Instruments:</b>                   |                                       |                                                                                                                                                                                               |
| microscope magnification level used             | RS                                    | Reference slides analyzed with multiple microscopes                                                                                                                                           |
| eye piece graticule & field of view calibration | RS                                    | Reference slides analyzed with multiple microscopes                                                                                                                                           |
| <b>Test Procedure Variations:</b>               |                                       |                                                                                                                                                                                               |
| portion and fields of sample analyzed           | RS                                    | Varies by analyst                                                                                                                                                                             |
| microbial density                               | RS                                    | High concentrations or clumps of spores may impact results                                                                                                                                    |
| interferences                                   | RS                                    | Debris level and resolution of spores in field of view                                                                                                                                        |
| ranges (high, medium, low)                      | RS                                    | Uncertainty may be concentration dependent. Lab should evaluate this as part of method validation.                                                                                            |
| <b>Data Manipulation:</b>                       |                                       |                                                                                                                                                                                               |
| reading, interpreting & reporting results       | RS                                    |                                                                                                                                                                                               |
| Accuracy of calculations                        | RS                                    | Manual, spreadsheet, LIMS, etc                                                                                                                                                                |
| area or air volume sampled                      | NA                                    | Typically provided by the customer. This is not part of analytical uncertainty, but must be considered by labs providing sampling and providing combined sampling and analytical uncertainty. |

MB = Daily method blank  
RS = Daily reference slides

Please note that the original column I (CV of the pair) of the “culturable analyses” tabbed worksheet had a formula incorrectly entered. The worksheet has been corrected and any affected values have been highlighted in yellow.

Table 12-2 Expanded Measurement Uncertainty Calculation Template

Examples of Analytical Measurement Uncertainty for Metals in Air

Metals in Air using hotblock acid digestion and ICP-EETSE Atlanta

Analysis by NIOSH 7300M/7303 Target LCS Recovery of Lead in Air EETSE Atlanta 18434 at 50.0 +/- 0.40 ug, Total

Sample duplicate data in ug, Total for Metals in Air using hotblock acid digestion and ICP-EETSE Atlanta by NIOSH 7300M/7303

Lead

| LCS ug, Total | True value ug, Total | LCS % Rec | ug, Total LCS | ug, Total LCSD | Std Dev (S) | CV     | CV2    |
|---------------|----------------------|-----------|---------------|----------------|-------------|--------|--------|
| 51.9          | 50.0                 | 103.8     | 51.9          | 52.9           | 0.7071      | 0.0135 | 0.0002 |
| 49.6          | 50.0                 | 99.2      | 49.6          | 48.7           | 0.6364      | 0.0129 | 0.0002 |
| 48.5          | 50.0                 | 97.0      | 48.5          | 50.6           | 1.4849      | 0.0300 | 0.0009 |
| 49.2          | 50.0                 | 98.4      | 49.2          | 48.2           | 0.7071      | 0.0145 | 0.0002 |
| 50.9          | 50.0                 | 101.8     | 50.9          | 51.7           | 0.5657      | 0.0110 | 0.0001 |
| 51.4          | 50.0                 | 102.8     | 51.4          | 47.7           | 2.6163      | 0.0528 | 0.0028 |
| 47.4          | 50.0                 | 94.8      | 47.4          | 47.1           | 0.2121      | 0.0045 | 0.0000 |
| 47.2          | 50.0                 | 94.4      | 47.2          | 49.8           | 1.8385      | 0.0379 | 0.0014 |
| 47.6          | 50.0                 | 95.2      | 47.6          | 47.8           | 0.1414      | 0.0030 | 0.0000 |
| 50.0          | 50.0                 | 100.0     | 50.0          | 50.4           | 0.2828      | 0.0056 | 0.0000 |
| 50.2          | 50.0                 | 100.4     | 50.2          | 50.8           | 0.4243      | 0.0084 | 0.0001 |
| 47.1          | 50.0                 | 94.2      | 47.1          | 46.8           | 0.2121      | 0.0045 | 0.0000 |
| 48.3          | 50.0                 | 96.6      | 48.3          | 46.0           | 1.6263      | 0.0345 | 0.0012 |
| 46.3          | 50.0                 | 92.6      | 46.3          | 48.2           | 1.3435      | 0.0284 | 0.0008 |
| 45.8          | 50.0                 | 91.6      | 45.8          | 49.1           | 2.3335      | 0.0492 | 0.0024 |
| 51.0          | 50.0                 | 102.0     | 51.0          | 53.1           | 1.4849      | 0.0285 | 0.0008 |
| 47.9          | 50.0                 | 95.8      | 47.9          | 47.7           | 0.1414      | 0.0030 | 0.0000 |
| 55.8          | 50.0                 | 111.6     | 55.8          | 55.4           | 0.2828      | 0.0051 | 0.0000 |
| 47.8          | 50.0                 | 95.6      | 47.8          | 49.3           | 1.0607      | 0.0218 | 0.0005 |
| 50.3          | 50.0                 | 100.6     | 50.0          | 49.9           | 0.0707      | 0.0014 | 0.0000 |
| 52.6          | 50.0                 | 105.2     | 52.6          | 49.0           | 2.5456      | 0.0501 | 0.0025 |
| 49.8          | 50.0                 | 99.6      | 49.8          | 49.2           | 0.4243      | 0.0086 | 0.0001 |
| 48.5          | 50.0                 | 97.0      | 48.5          | 51.8           | 2.3335      | 0.0465 | 0.0022 |
| 50.2          | 50.0                 | 100.4     | 50.2          | 47.2           | 2.1213      | 0.0436 | 0.0019 |
| 49.2          | 50.0                 | 98.4      | 49.2          | 49.8           | 0.4243      | 0.0086 | 0.0001 |
| 52.2          | 50.0                 | 104.4     | 52.2          | 49.2           | 2.1213      | 0.0418 | 0.0018 |
| 48.1          | 50.0                 | 96.2      | 48.1          | 48.2           | 0.0707      | 0.0015 | 0.0000 |
| 49.2          | 50.0                 | 98.4      | 49.2          | 47.8           | 0.9899      | 0.0204 | 0.0004 |
| 48.1          | 50.0                 | 96.2      | 48.1          | 46.7           | 0.9899      | 0.0209 | 0.0004 |
| 52.7          | 50.0                 | 105.4     | 52.7          | 48.4           | 3.0406      | 0.0601 | 0.0036 |

30 point Mean %

Rec. 99.0

30 point Std Dev

4.4

RSD

4.4%

$\sum CV^2$

0.0246

$CV_{pooled} = \sqrt{(\sum CV^2/30)} =$

0.0287

Combined Rel. Std Dev (SDc) =  $\sqrt{SD^2 + SD^2}$  2.87% RSD

$SDc = \sqrt{[(4.4)^2 + (2.87)^2]} = 5.25\%$

Expanded MU @ 95% Conf (k=2) = 10.5%

Bias @ 99.0% Rec of LCS = -1.0%

Example analytical uncertainty for 50 ug, Lead in Air sample:

Expanded analytical uncertainty of 50 ug, Lead in Air = 50 X 0.105 = 5.25 ug, Total

Bias = 50 ug, Total X -0.010 = 0.500 ug, Total

Example of reporting for 50 ug, Total of Lead in Air:

50 ug, Total of Lead in Air with an analytical uncertainty of +/- 5.3 ug, Total at the 95% confidence level and a probable bias of -0.50 ug, Total

Table 12-3  
Estimation of Uncertainty Requirements for non AIHA LAP

| Method                                        | Uncertainty Based On |
|-----------------------------------------------|----------------------|
| E120.1 Conductivity                           | Method Limits        |
| E160.4 VS                                     | NA                   |
| E180.1 Turbidity                              | Method Limits        |
| E200.7 ICP EETSE Atlanta Metals               | Method Limits        |
| E200.8 ICP MS Metals                          | Method Limits        |
| E245.1 Mercury                                | Method Limits        |
| E300.0 Anions by IC                           | Method Limits        |
| E350.1 Ammonia                                | Method Limits        |
| E351.2 TKN                                    | Method Limits        |
| E353.2 Nitrate Nitrite                        | Method Limits        |
| E365.1 Ortho Phosphorus                       | Method Limits        |
| E365.1 Total Phosphorus                       | Method Limits        |
| E410.4 COD                                    | Method Limits        |
| E420.1 Total Phenolics                        | Method Limits        |
| E420.4 Total Phenolics                        | Method Limits        |
| E615 Herbicides                               | Historical Limits    |
| E624.1 VOCs                                   | Method Limits        |
| E625.1 SVOCs                                  | Method Limits        |
| E1664B Oil and Grease TPH                     | Method Limits        |
| NECi N07-0003 Nitrate-Nitrite                 | Method Limits        |
| FL-PRO                                        | Method Limits        |
| RSK-175 Dissolved Methane, Ethane, Ethene     | Method Limits        |
| SM2120B-2011 Color                            | NA                   |
| SM2120F-2011 Color ADMI                       | NA                   |
| SM2310B-2011 Acidity                          | NA                   |
| SM2320B-2011 Alkalinity                       | Method Limits        |
| SM2340B-2011 Hardness                         | Method Limits        |
| SM2540B-2015 TS                               | NA                   |
| SM2540C-2015 TDS                              | NA                   |
| SM2540D-2015 TSS                              | NA                   |
| SM2540F-2015 Settleable Solids                | NA                   |
| SM2540G-2015 Total, Fixed and Volatile Solids | NA                   |
| SM3500CrB-2011 Hexavalent Chromium            | Method Limits        |
| SM3500FeB-2011 Ferrous Iron                   | Method Limits        |
| SM4500ClG-2011 Total Residual Chlorine        | Method Limits        |
| SM4500CNG-2016 Amenable Cyanide               | Method Limits        |
| SM4500CNE-2016 Total Cyanide                  | Method Limits        |
| SM4500H <sup>+</sup> B-2011 pH                | NA                   |
| SM4500OH-2016 Dissolved Oxygen                | NA                   |
| SM4500S2F-2011 Sulfide                        | Method Limits        |



| Method                               | Uncertainty Based On |
|--------------------------------------|----------------------|
| SM4500SO3B-2011 Sulfite              | NA                   |
| SM5210B-2016 BOD                     | Method Limits        |
| SM5210B-2016 CBOD                    | Method Limits        |
| SM5310B-2014 TOC                     | Method Limits        |
| SM5540C-2011 MBAS Surfactants        | Method Limits        |
| SM10200H-2011 Chlorophyll            | Historical Limits    |
| SM9222B-2015 Total Coliforms         | NA                   |
| SM9222D-2015 Fecal Coliforms         | NA                   |
| SM9223B-2016/QUANTI-TRAY E.Coli      | NA                   |
| SW1010 Flash Point                   | NA                   |
| SW1030 Ignitability                  | NA                   |
| SW1311 TCLP                          | Historical Limits    |
| SW1312 TCLP                          | Historical Limits    |
| SW6010 ICP EETSE Atlanta Metals      | Method Limits        |
| SW6020 ICP MS Metals                 | Method Limits        |
| SW7.3 Reactive Cyanide               | Method Limits        |
| SW7.3 Reactive Sulfide               | Method Limits        |
| SW7196 Hexavalent Chromium           | Method Limits        |
| SW7470 Mercury in Water              | Method Limits        |
| SW7471 Mercury in Soils              | Method Limits        |
| SW7473 Mercury in Soils              | Method Limits        |
| SW8011 EDB DBCP                      | Historical Limits    |
| SW8015 DAI                           | Historical Limits    |
| SW8015 DRO                           | Historical Limits    |
| SW8015 GRO                           | Historical Limits    |
| SW8081 Pesticides                    | Historical Limits    |
| SW8082 PCBs                          | Historical Limits    |
| SW8151 Herbicides                    | Historical Limits    |
| SW8260 VOCs                          | Historical Limits    |
| SW8270 SVOCs                         | Historical Limits    |
| SW8310 PAHs                          | Historical Limits    |
| SW8315 Formaldehyde and Acetaldehyde | Historical Limits    |
| SW9010 9012 Cyanide                  | Method Limits        |
| SW9010 9014 Cyanide                  | Method Limits        |
| SW9030 9034 Sulfide                  | Method Limits        |
| SW9038 Sulfate                       | Method Limits        |
| SW9040 pH in Water                   | NA                   |
| SW9041 pH by Paper                   | NA                   |
| SW9045 pH in Soil                    | NA                   |
| SW9050 Conductivity                  | Method Limits        |
| SW9056 Anions by IC                  | Method Limits        |
| SW9060 TOC                           | Method Limits        |
| SW9065 Total Phenolics               | Method Limits        |

| Method                              | Uncertainty Based On |
|-------------------------------------|----------------------|
| SW9070 Oil and Grease TPH in Water  | Method Limits        |
| SW9071 Oil and Grease TPH in Soils  | Method Limits        |
| SW9095 Free Liquids by Paint Filter | NA                   |
| TO-14A, TO-15                       | Method Limits        |

## 12.12 Recommended Storage Conditions

The locations for the storage of all standards, reagents, and working solutions are based upon compatibility of the material with other materials, flammability, and intended use of the material.

The following general guidelines apply to the storage of standards and reagents.

12.12.1 The locations for the storage of all standards, reagents, and working solutions are based upon compatibility of the material with other materials, flammability, and intended use of the material. The following general guidelines apply to the storage of standards and reagents.

12.12.2 The recommended storage conditions are included in the chemical inventory of LIMS when adding information pertaining to new standards and reagents.

12.12.3 Each department maintains storage locations for standards, reagents, working solutions, and samples. Department supervisors ensure that all chemicals are properly kept. Department supervisors periodically audit storage areas for possible hazards and violations.

12.12.4 Samples are never stored in the same location as standards or reagents.

12.12.5 The following major categories of chemicals, compressed gases, and samples determine standard and reagent storage conditions in the laboratory:

12.12.5.1 Flammables

12.12.5.2 Oxidizer

12.12.5.3 Acids

12.12.5.4 Bases

12.12.5.5 Compressed flammable gas cylinders

12.12.5.6 Compressed non-flammable gas cylinders

12.12.5.7 VOC Samples

12.12.5.8 Inorganic and SVOC Samples

12.12.6 The certificate of analysis or Material Safety Data Sheet provides relevant information regarding recommended storage conditions for all standards and reagents.

## 12.13 Handling Standards and Reagents

12.13.1 Safety glasses and latex type gloves must be worn at all times when handling chemicals, samples, standards or reagents. A lab coat is also highly recommended. Closed-toe shoes and clothing that cover the legs (no shorts or dresses) must be worn whenever an analyst is working in the lab.

12.13.2 The toxicity or carcinogenicity of each reagent used in the laboratory has not been fully established. Each chemical should be regarded as a health hazard and exposure to it should be kept as low as reasonably possible. All health and safety concerns for these and any other chemicals are listed in the Material Safety Data Sheets (MSDS) provided by the supplier or

manufacturer of these chemicals. A copy of any MSDS is available for review at any time in notebooks maintained in the Sample Receiving Department.

12.13.3 Proper disposal of all wastes is essential. Containers are provided for all waste according to the type. Follow the waste disposal guidelines found in Section 17.0 for disposing of chemicals.

### 12.14 Record Keeping Definitions

12.14.1 Prep Log: A prep log is defined as a log of the preparation process that is applied to samples before they are analyzed. This log includes initial volume/weight, final volume, date prepped, batch number, spike amount, all spike information and any comments pertaining to the sample preparation.

12.14.2 Back Log Report: A backlog report is defined as a list of all the samples that need to be analyzed for a specific department. This list is generated from the LIMS system. The list is used by each department manager to create a batch for analysis.

12.14.3 Extraction or Digestion Log: An extraction or digestion log is defined as a log of samples that are either extracted or digested for subsequent analysis. This log includes initial volume/weight, final volume, date prepped, batch number, spike amount, all spike information and any comments pertaining to the sample preparation.

### 12.15 Procedures for Record Keeping

12.15.1 The record keeping system allows for historical reconstruction of all laboratory activities that produced the analytical data. All raw data (including Quality Control information) from the instrumentation is both posted to the laboratory archive system, referred to as the "Portal Server", and backed up weekly by the IT Department. In addition, instrument sequences are posted to the portal server by instrument, year, month, and sequence. Prep log sheets are posted by batch number, while logbooks are additionally scanned and posted by the QA Department as a backup copy. In addition, electronic data associated with each instrument is periodically stored off site.

12.15.1.4 Project Management: Each project manager has a project folder with the COC and sample receipt checklist (SRCL) in their office until the project is completed. Once the project is completed, either a hardcopy or PDF file of the report and invoice are printed, along with a cover letter and case narrative (if necessary). If everything is correct, the project is reported to the client via email or hardcopy mailing. The PDF files of the COC, Sample Receiving Checklist and invoice are posted to the portal server by work order number, year, and month. Any revisions are posted in the same folder with the revision having "REVISION" in the file name. **The reason for the change needs to be documented in the narrative.** If the client requires an Electronic Disc Deliverable (commonly referred to as an EDD) or a Data Package, this information is also posted on the Portal Server. Reports are kept for five years.

12.15.1.5 LIMS System: The LIMS system holds all the information relevant to each project that is received at the laboratory, including all client information, and prep and analysis information for each test performed. LIMS data is backed up daily onto CDs. Copies are stored both on and off site.

12.15.1.6 Entries in manually recorded records are not obliterated by methods such as erasures, overwriting, whiteout or markings. All corrections to record-keeping errors are made by one line marked through the error. The individual making the correction initials and dates the correction.

12.15.1.7 Corrections to electronic records are made by a manual notation that indicates the change to the record. This notation is kept with the affected record.

## 12.16 Record Storage

- 12.16.1 All records for each project that is received at the laboratory must be held for a minimum of five years (also, now 5 years for lead analysis records per AIHA LAP). Final reports are maintained electronically on computer hard drives and daily back-up tapes.
- 12.16.3 Electronic records are stored by department on the laboratory's portal server after scanning or converting the documentation to a PDF file format using Adobe Acrobat®. Customer Service stores the client reports by work order number. Laboratory data is downloaded and stored by department (Asbestos, Inorganic Chemistry, Metals, Microbiology, Sample Prep, Semi-Volatile Organics, Volatile Organics, and Wet Chemistry). Data contained in the Laboratory Information Management System (LIMS) and on other servers is backed up daily onto CDs. There is also a second server that contains a duplicate of this information.
- 12.16.4 Archive areas are protected against fire, theft, loss, environmental deterioration and vermin. Electronic records are also protected from electronic or magnetic sources. Access to recent records is limited and maintained by logon and password. In addition, a portion of the portal server has been designated specifically as an "Archive area". These Archive areas house information that is older and has additional access restrictions. Archive areas are regularly inspected as part of the Internal Audit program. Representatives of an accrediting authority may have access to archived information.
- 12.16.5 In the event that EETSE Atlanta, Inc. transfers ownership, the new proprietors retain sole custody and responsibility for all records. If EETSE Atlanta were to close, records shall be maintained at a commercial archive facility or maintained by another laboratory within the network. Records may also be transferred back to clients, if requested.

## 12.17 Quality Assurance Records

Where necessary, records are generated and maintained for all quality associated activities conducted during all phases of the analytical work. QA records provide sufficient evidence that all specified QA requirements have been accomplished and satisfied and provide sufficient documentation to substantiate all reported findings and conclusions. These records are retained by EETSE Atlanta, Inc. after the initial issuance of the report for a minimum of five years in accordance with AIHA LAP and TNI requirements. This ensures the availability of the QA historical information. The following types of records shall be identifiable and retrievable:

- 12.17.1 General QA Records - Records pertaining to procurement activities; results of reviews & audits; qualifications of personnel; Standard Operating Procedures and Document Control Records.
- 12.17.2 Inspection and Test Data Records - Records pertaining to in-process inspection and tests, Equipment Logs and Maintenance Logbooks.
- 12.17.3 Generated raw data, reports, etc.

## 13.0 CORRECTIVE ACTION AND NON-CONFORMANCES

Deficiencies or non-conformances in analytical procedures, materials, components or methodology may lead to the release of incorrect analytical results to the customer. Once a deficiency or non-conformance has been identified, corrective actions must be implemented to insure proper data qualification and narration on the final client report and, when possible, prevent the deficiency being repeated. To document and track the non-conformance, a Corrective Action Report (CAR) is issued through the LIMS system. An example of a Corrective Action Report is contained in [Appendix VI](#).

## 13.1 Standard Procedure for Defining, Implementing, and Closing a Corrective Action Report (CAR).

13.1.1 Non-conformance: A non-conformance is defined as any situation that is either outside acceptable limits (data) or does not comply with the procedure/method in some way (preservation, matrix, etc.). The following are examples of situations considered non-conformances for which the completion of a CAR report is required.

13.1.1.1 Contamination in the Blank: The presence of target analytes in the blank that are above the reporting limit or in some cases, the MDL.

13.1.1.2 Failing Laboratory Control Sample (LCS): When the percent recoveries of target analytes in an LCS fail to meet the acceptable limits for an analysis.

13.1.1.3 Failing Matrix Spike (MS): When the percent recovery of a target analyte in a MS fails to meet the acceptable limits of analysis.

13.1.1.4 Failing Duplicate: When the relative percent difference (RPD) of results between two aliquots of the sample exceed the maximum allowable RPD.

13.1.1.5 Improper sample preservation: When a sample does not have the correct preservation (usually this involves temperature or pH).

13.1.1.6 Exceeding EPA recommended holding time: When a sample is prepared (extracted or digested) and or analyzed after holding time has expired.

13.1.1.7 Sample integrity has been compromised: When a sample container is broken, is improperly sealed, is inappropriate for the analysis, or has headspace (volatiles).

13.1.1.8 Surrogates/Internal standards fail (organic analysis): When a surrogate(s) or internal standard fails to meet the acceptable quality control limits associated with the test method.

13.1.1.9 Dilution test (metals analysis): When the sample dilution test fails to meet the acceptable quality control limits associated with the test method.

13.1.1.10 Failure to meet batch requirements (insufficient sample volume for MS/MSD, etc.)

13.1.1.11 Poor chromatography or missing analytes.

13.1.1.12 Expired standards and reagents.

13.1.1.13 Failed Proficiency Test (PT) analyte.

13.1.2 Procedure for the issuing, completing, and closing of an analytical or technical related CAR.

13.1.2.1 When a non-conformance occurs, the employee performing the work, the initial data reviewer, a Project Manager, or the Department Manager must issue a CAR in the LIMS system as indicated below.

13.1.2.1.1 From the "Categories" menu select "Quality Control". Then from the "Options" menu select "Corrective Action Reports".

13.1.2.1.2 Click "Add" and the LIMS will create a new CAR and automatically number it. Fill in the fields for "Department", "Instrument ID", "Batch ID", "Initiated By" and "Initiated On" as appropriate.

13.1.2.1.3 Fill in the "Summary" field with a brief description of the non-conformance.



- 13.1.2.1.4 Fill in the “Complete Description of Non-conformance” field with a detailed description of the non-conformance including batch numbers, affected samples by number, recoveries and control limits if applicable, etc.
- 13.1.2.1.5 The complete data file or log book is then forwarded to the Dept. Manager for review. This file must include raw data, prep information, review checklists, etc. and a reference to the CAR by number.
- 13.1.2.1.6 The Dept. Manager brings the Corrective Action Report to the Laboratory Manager, who determines whether the non-conformance is a “deficiency” or “anomaly”. An anomaly is an occurrence that affects only the group of data in the associated batch or sequence. Human errors or mistakes are usually anomalies. A deficiency is an occurrence that is system related and may affect more than the batch and may require more extensive corrective actions which could include retraining, replacing equipment, revising SOPs, etc. If the CAR is anomaly, the Department Manager is instructed to document required corrective action in the “Corrective Action Required” field. If the CAR is a deficiency, enter a statement in the “Corrective Action Required” section that the CAR will be forwarded to the QA Manager for review. The QA Manager performs an investigation and documents the root cause investigation in the “Corrective Action Required” section of the CAR form. Monitoring requirements of actions and the need for additional audits are also documented in this section. If no root cause investigation is required, the QA Manager may instead comment with a “QA Statement”. When the QA Manager completes the review, the CAR is closed or Laboratory Manager or Technical Director is notified to review the data and perform the required corrective action (which is documented in the “Corrective Action Required” field).
- 13.1.2.1.7 These corrective actions may include narrating the non-conformance to the affected jobs, sending affected samples to be re-prepped and/or reanalyzed, performing instrument maintenance, etc. Non-conformances may also be referred directly to the QA Dept. for more extensive action if necessary. The person filling in the “Corrective Action Required” field then fills in the “Completed By” and “Date” fields.
- 13.1.2.1.8 If the non-conformance is determined to be an anomaly, the Dept. Manager completes the “CAR Closed By” and “Date” fields at the end of the CAR form.
- 13.1.2.1.9 If the non-conformance is determined to be a deficiency, full QA review and documented corrective action to prevent recurrence is required. A root cause will be identified for deficiencies. Root cause analysis typically addresses those issues which historically have been addressed again and again with quick fixes but it may also be applied in those instances where a process or methodology is affected. Working harder and faster on the same items does not increase efficiency. Root cause analysis allows one to think through the problem and address the causes rather than its effects. By eliminating the root cause, time and money are saved.  
 Steps for a root cause analysis include:
  1. Identifying the problem. You must define the problem accurately to address the true root cause.
  2. Understand the problem. Check the data regarding the problem to gain a clear understanding of the underlying issues. This can be accomplished by using several root cause analysis techniques such as brainstorming, use of control charts, or the “5 Whys” technique.



## Environment Testing

- a. With the Brainstorming technique, ideas are collected from people associated with problem. All ideas should be considered and more is better because of not knowing what might work. Brainstorming utilizes a set time limit. Discussion about the ideas takes place after brainstorming is complete. Those involved build on the ideas to resolve the root cause.
  - b. Control Charts can be used to study trends associated with data over time to draw conclusions as to whether a process is consistent (within defined limits) or is unpredictable (outside of defined limits). Where applicable, control charts can pinpoint when a problem started and/or stopped.
  - c. “5 Whys” refers to the practice of asking, 5 times, why the failure has occurred in order to get to the root cause of the problem. Each “Why” brings one closer and closer to the root cause. It should be noted that sometime more or less “Whys” are required to get to the root cause. The use of five is a guide.
3. Corrective Action. Determine the probable underlying cause(s) of the problem. Take corrective action(s) to eliminate the causes.

Root causes will be categorized as one of the following: personnel, (LIMS) database, Quality Control, procedure, or laboratory controls.

- 13.1.2.1.9.1 Personnel: Root causes attributed to personnel may require training or retraining to insure individuals understand their responsibilities in the process.
- 13.1.2.1.9.2 Database: A Root cause from a database issue primarily refers to the Laboratory Information Management System (LIMS). This type of nonconformance will require the database to be updated. This may include method information (test codes), client information, project information, login entries, calculations, audit trail, and reports among others. Database root cause will also include individual instrument databases and software (GCs, ICPs, AA, Lachat autoanalyzers, etc.)
- 13.1.2.1.9.3 Quality Control: QC root causes result from incorrect QC acceptance ranges in logbooks, LIMS or are the result of trend changes. These will be reviewed and updated as necessary.
- 13.1.2.1.9.4 Procedure: This root cause covers procedures, policies, checklists, standard operating procedures (SOPs) that will be reviewed for modifications.
- 13.1.2.1.9.5 Laboratory Controls: Root causes from instrumentation, software and equipment will be investigated. These may require maintenance, repair, or updates.
- 13.1.2.1.9.6 A deficiency may require halting analysis on the affected test, notifying clients when previous data may have been affected or other significant corrective actions.
- 13.1.2.1.10 Once the required corrective actions associated for a deficiency have been completed, fully documented and systems deemed back in control the QA Dept or Technical Director will close the CAR and affected procedure may again be used. The CAR is then printed out, signed by the Technical Director or QA Manager, placed with the data and scanned and posted to the portal server.
- 13.1.2.1.11 The Technical Director, QA Manager, or any employee may determine that a potential nonconformance requires a preventive action report. Preventive actions are potential sources of nonconformance and needed improvements. “Preventive Action

Report” can be initiated by an employee from the results of employee suggestions, data review, audits, etc. and then reviewed by the Technical Director or the QA Manager. Preventive actions are incorporated in the corrective action template (due to software limitations). When the corrective action template is to be used for a preventive action report, the phrase ‘PREVENTIVE ACTION’ is typed in the “QA Action” field. This distinguishes a preventive action template from a corrective action template. Where appropriate, action plans shall be developed; implemented and monitored that will reduce the likelihood of nonconformance. Action plans shall include the application of controls to ensure that actions taken are effective, and may involve the reanalysis of data, additional auditing, control charts and trends, additional proficiency or QC testing, and issuance of correspondence to clients.

13.1.2.2 The CAR must be prepared at the time the analytical batch has been calculated. Do not wait until all data from the batch is completed. This will lead to unnecessary delay in reprocessing the batch (if necessary) and informing laboratory management, project management, and the client.

13.1.2.3 When completing a CAR, include all accompanying data, information, etc in a "Data Package" along with the NCR and submit this to the Technical Director or Quality Assurance Manager for review. Data packages include the following information.

- Digestion or extraction bench sheets
- ICP and other instrument data such as LACHAT printouts
- All chromatograms within the analytical batch including CCVs
- GC/MS tune criteria
- Analytical "run logs"
- MB, LCS, MS, CCV, post dilution spikes, etc which clearly indicate the results and or percent recoveries (where applicable).
- Any other test specific quality control criteria such as surrogate recoveries and method of additions results

13.1.3 Circumstances for initiating a customer service or project management related CAR.

13.1.3.1 The following types of client complaints or problems will be referred to as Laboratory CARs and should be brought to the Business Unit Manager or the Laboratory Manager. These include but are not limited to:

13.1.3.1.1 Customer Service related complaints

13.1.3.1.2 Comments regarding laboratory services provided

13.1.3.1.3 Any requests after analyses have been completed and files archived

13.1.3.1.4 Client is questioning the results

13.1.3.1.5 Confirmation request

13.1.3.1.6 EDD or Data Package issue

13.1.3.1.7 H flags need to be removed

13.1.3.1.8 Question regarding method used

13.1.3.1.9 Carry over issue

13.1.3.1.10 Questions from regarding an unusual sample or matrix received

- 13.1.3.2 CARs are also required for internal issues. These must also be brought to the Business Unit Manager or the Lab Manager and will be referred to as Internal CARs:
- 13.1.3.2.1 Test code issue
  - 13.1.3.2.2 Problem with LIMS
  - 13.1.3.2.3 EDD Problem
- 13.1.3.3 Certain issues will be handled by the Executive Director of Customer Service. These will be referred to as Customer Service CARs.
- 13.1.3.3.1 Reporting limits are missing
  - 13.1.3.3.2 Analyses times incorrectly entered (especially for short holding time tests)
  - 13.1.3.3.3 Discrepancies and errors found in the QC report
  - 13.1.3.3.4 Analytes reported twice or missing from the report
  - 13.1.3.3.5 Pricing or invoice error
  - 13.1.3.3.6 Login error
  - 13.1.3.3.7 Client wishes to add an analyte or test
  - 13.1.3.3.8 Incorrect bottle order
  - 13.1.3.3.9 Shipping Issues
  - 13.1.3.3.10 Courier issues
  - 13.1.3.3.11 In certain instances, as determined by the Executive Director of Customer Service, a corrective action report will be initiated when jobs with 'Rush' turnaround times or some with routine turnaround times are 48 hours past due.
- 13.1.3.4 Summary of Procedure:
- 13.1.3.4.1 When any of the instances listed in the Scope and Application chapter of this SOP take place, corrective action should be initiated in LIMS (Laboratory Information Management System).
  - 13.1.3.4.2 Each Corrective Action has unique control number automatically assigned by LIMS when form is initiated.
  - 13.1.3.4.3 Project Manager initiates a corrective action. The CAR should include details of the issue, incident or client's request, and forwards report with all supporting documents to either the Business Unit Manager/Laboratory Manager or the Executive Director of Customer Service as outlined above. After decisions on how to handle the corrective action are made, information will be relayed to the client and necessary follow up are performed.
  - 13.1.3.4.4 Corrective action number must be entered into the comments section of the appropriate work order number in LIMS.

- 13.1.3.5 Responsibilities: It is the responsibility of each project manager to ensure the following
- 13.1.3.5.1 Be pro-active and initiate CAR in a timely manner
  - 13.1.3.5.2 Enter CAR number into the comment section of the work order number in LIMS. Initials of the project manager and the date should accompany it.
  - 13.1.3.5.3 Gather all supporting information
  - 13.1.3.5.4 Follow up on all open CARs to make sure all issues are resolved promptly
  - 13.1.3.5.5 Once the Business Unit Manager or the Executive Director of Customer Service review the CAR and make their recommendations, write down these actions under “Corrective Action Required” area. Remember to mark the ‘Notify Clients’ box in the CAR and include the name of the individual who did so. There is also a space for a comment, if needed. If follow-up is required by the QA Manager or the Technical Director as instructed by the Business Unit Manager, enter a statement in the “Corrective Action Required” area that the CAR will be forwarded to the appropriate person, who will then address their portion and close the CAR and notify the Executive Director of Customer Service.
  - 13.1.3.5.6 If no action is required by the QA Manager or Technical Director, the Project Manager will notify either the Business Unit Manager or Executive Director of Customer Service for review depending on what type of CAR it is. The Business Unit Manager or Laboratory Manager will close all Laboratory and Internal CARs while the Executive Director of Customer Service will close all Customer Service CARs.
- 13.1.3.6 It is the responsibility of the Business Unit Manager to ensure the following:
- 13.1.3.6.1 Review CARs and all supporting paperwork on a daily basis
  - 13.1.3.6.2 As appropriate, come up with necessary decision/recommendations and document them in the Corrective Action Required field in LIMS.
  - 13.1.3.6.3 Review “Corrective Action Required” completed by PM
  - 13.1.3.6.4 Make sure CARs promptly closed upon resolution
  - 13.1.3.6.5 Review all CARs on an ongoing basis to assure all CARs have been closed and necessary follow up took place (follow up with QA Manager and Technical Director, if needed)
- 13.1.3.7 Procedure to generate CAR in LIMS, follow the following steps:
- 13.1.3.7.1 From Main Menu go to Quality Assurance
  - 13.1.3.7.2 Select Corrective Action Reports
  - 13.1.3.7.3 Click “Add” and number will be automatically assigned through the LIMS
  - 13.1.3.7.4 Enter PM under Department
  - 13.1.3.7.5 Enter Client ID
  - 13.1.3.7.6 Fill in the “Summary” field by writing short description of the CAR

- 13.1.3.7.7 Fill in the “Initiate By” and “Initiated On” fields
- 13.1.3.7.8 Write a complete and thorough description of the Nonconformance in the “Complete Description of the Non-Conformance” field. The following details must be included for all CARs:
  - 13.1.3.7.8.1 Client’s company name
  - 13.1.3.7.8.2 Work order number and all sample number(s).
  - 13.1.3.7.8.3 Date, time and name of all communications with client representative regarding this issue.
  - 13.1.3.7.8.4 If the problem is internal, make sure to include laboratory department involved and names of laboratory analysts, etc.
  - 13.1.3.7.8.5 If CAR is related to the bottle order or quote, please make sure to include bottle order or quote number
  - 13.1.3.7.8.6 If a credit needs to be issued please make sure to include explanation why, prices used, new prices and documentation supporting new prices, such as quotes, or previous invoice, etc.
- 13.1.3.8 Once CAR number is assigned, this number must be entered in the comment section of LIMS under work order/work orders associated with the CAR! (please note that in some cases, no work order may be associated with the CAR)
- 13.1.3.9 Every CAR must be detailed and contain supporting documentation. This documentation must be present in order for the CAR to be closed. CAR that has missing info or details will be returned to the PMs and will not be closed until all the info is provided. Complete CAR must be forwarded to the Executive Director of Customer Service or Laboratory Manager in case of the Executive Director of Customer Service’s absence. These are some of the examples for the supporting documentation required:
  - 13.1.3.9.1 In case of CAR about additional analytes requested after final report has been mailed to the client, please do the following:
    - 13.1.3.9.1.1 Describe client’s request in the CAR and e-mail the Executive Director of Customer Service (when possible, forward the client’s email).
    - 13.1.3.9.1.2 the Executive Director of Customer Service will review the CAR and determine if EETSE Atlanta can fulfill the request
    - 13.1.3.9.1.3 If EETSE Atlanta can fulfill the request, the Executive Director of Customer Service will e-mail to PM to make necessary changes in the log in
    - 13.1.3.9.1.4 Executive Director of Customer Service will then email the appropriate lab manager referencing the CAR number, and the requested changes to be made.
    - 13.1.3.9.1.5 After changes are made, necessary corrections will be made to the report.
    - 13.1.3.9.1.6 Once corrections are made, the Executive Director of Customer Service will inform PM to proceed with report revision. Make sure to issue revision note on the cover letter. We are required by NELAC and other certifying / accrediting agencies to document any changes that were made after final copy of the report is mailed to the client.

- 13.1.3.9.1.7 If revision reflects in a price change, M invoice must be generated or old invoice amended, depending on the arrangements made with a client. It is PM's responsibility to list any additional charges when submitting CAR and provide a decision if new M invoice or changes to an old invoice are required.
- 13.1.3.10 In case of CAR about incorrect prices or invoice please make sure to provide the:
- 13.1.3.10.1 Old invoice
  - 13.1.3.10.2 COCR
  - 13.1.3.10.3 Copy of COC
  - 13.1.3.10.4 Price quote (if any)
  - 13.1.3.10.5 If invoice is being changed in the LIMS system please make sure to save as a revised invoice on portal. The revised invoice, and COCR are then email to Accounts Receivable, referencing the CAR number. Accounts receivable will then update Peachtree, COCR, and add comments to CAR indicating this.
  - 13.1.3.11 For a CAR about bottle order or shipping, provide a copy of the bottle order tracking number and any other documentation that will support the CAR, such as client's fax, etc.
  - 13.1.3.12 The Executive Director of Customer Service will address issues that involve pricing, inclusion of an additional analyte from the existing method, addition of another test to the work order, or a request for another report format (i.e. MDL Report). All other issues should initially be brought to the Business Unit Manager or Laboratory Manager for review. When the Business Unit Manager/Laboratory Manager has assessed the corrective action report, he will either give it back to the Project Manager with the action to resolve the issue or forward it to another person to continue the investigation. Typically, these CARs will go to the Department Directors, the Technical Director, or the QA Manager.
- When CAR is completed by the laboratory personnel, the CAR file will be returned to the PM for client resolution (i.e. price changes, report reissued, etc.). The Executive Director of Customer Service must be notified about the completion of all PM CARs. All PM CARs that have not been closed by the QA Manager or Technical Director are closed by the Executive Director of Customer Service.
- 13.1.4 Instances when an expedited Corrective Action Report is Required
- 13.1.4.1 Missed hold times (in which the sample was received within hold)
  - 13.1.4.2 Broken or spilled samples limiting analysis
  - 13.1.4.3 Client submits what appears to be blind QC samples or spiked duplicates
  - 13.1.4.4 Any time a sample exhibits peculiar behavior such as strong chemical odor, makes eyes water, sample steaming when lid removed, sample smoking, effervescing, or pressure release when opened (like a soda) etc.
  - 13.1.4.5 A known hazardous sample received (PCB oil, jar of mercury, Hydrofluoric Acid, etc.)
  - 13.1.4.6 When meeting the client/sample requirements involve OT or unscheduled weekend work
  - 13.1.4.7 When incorrect sample preservation is noted
  - 13.1.4.8 When litigation or public investigation (a news story) associated with sample is involved.
  - 13.1.4.9 When a CAR has been initiated for reanalysis in order to reissue a new result.
- 13.1.5 Per AIHA LAP LQSR section 4.8, complaints about the quality of reported results may be referred to the accrediting body if such complaints cannot be resolved directly with the customer.



- 13.2 General Procedures and Responsibilities for Corrective Action Reports Involving Deficiencies.
- 13.2.1 When the QA Dept. or Technical Director issues a corrective action report (CAR) for a non-conformance classed as a deficiency, the Laboratory Manager, Executive Director of Customer Service or Technical Director will be informed immediately.
- 13.2.2 The QA Manager will track the completion of the corrective actions required to correct the deficiency. The assigned personnel are responsible for completing the corrective action within the specified time frame.
- 13.2.3 The chain of custody and the Sample Receipt Forms are used to document non-conformance during log-in.
- 13.3 Method Suspension or Restriction
- 13.3.1 In some cases, it may be necessary to suspend or restrict the use of a method that constitutes significant risk and or liability to EETSE Atlanta. Suspension or restriction procedures can be initiated by the Quality Assurance Manager, Technical Director, Laboratory Manager, or Business Unit Manager.
- 13.3.1.1 Prior to suspension or restriction, confidentiality is respected, the problem and the required corrective action is stated in writing on the associated CAR and presented to the Laboratory Manager.
- 13.3.1.2 The Laboratory Manager, Technical Director, Quality Assurance Manager, and the affected supervisor are notified.
- 13.3.1.3 The Laboratory Manager arranges for the operations people to speak with the Quality Assurance Manager or Technical Director the day of notification. This meeting is held to confirm that there is a problem and that suspension/restriction of the method is required.
- 13.3.2 The suspension or restriction meeting will conclude with a discussion of the steps necessary to bring the method or test fully back on line if the method is suspended or restricted. The Quality Assurance Manager will also specify any documentation necessary to verify that corrective action has occurred.
- 13.3.3 After suspension or restriction, the laboratory will hold all reports to clients pending review. No faxing, mailing or distributing through electronic means may occur. It is the responsibility of the Laboratory Manager to hold all reports. Clients will not generally be notified at this time. Analysis may proceed in some instances depending on the non-conformance issue.
- 13.3.4 Upon completion of the required corrective actions per the CAR, laboratory management will determine if the affected systems are back in control. Once documentation and data associated with the CAR have been reviewed and approved by upper management, the Business Unit Manager, Laboratory Manager, Quality Assurance Manager, or Technical Director will notify laboratory personnel to resume testing. At that time, reports can be released. If systems are still deemed out of control, further corrective actions are required. A team, with all principals involved can devise a startup plan to cover all steps from client notification through compliance of method and release of reports.
- 13.3.5 If the QA Dept. or Technical Director recommends client notification regarding effects on past or current data quality, all associated information is forwarded to the Laboratory Manager and Business Unit Manager. They will review the data and determine appropriate actions.

13.3.6 Client notifications are the responsibility of the Laboratory Manager and Business Unit Manager.

13.4 Procedure for the issuing, completing, and closing of a PM or Customer Service related CAR.

13.4.1 CAR should be opened for the following reasons:

- a) Any client complaints regarding prices, customer and laboratory service provided, courier service, bottle orders, shipping, invoices, analyses, additional requests after reports have been issued and files archived, etc.
- b) Any situation that might have occurred within the laboratory such as results not reported on time, missing information (i.e. reporting limits, analysis dates and times, missing samples, missing analytes, etc.).

13.4.2 CAR must be generated through LIMS as follows:

- a) From Main Menu go to “Quality Assurance”
- b) Select Corrective Action Reports
- c) Click “Add” and number will be automatically assigned through the LIMS
- d) Enter PM under Department
- e) Enter Client ID
- f) Fill in the “Summary” field by writing short description of the CAR
- g) Fill in the “Initiate By” and “Initiated On” fields
- h) Write a complete and thorough description of the Nonconformance in the “Complete Description of the Non-Conformance” field. For all CARs details must include: client’s name, work order number, date, time and name of the person spoken to. If the problem is internal, make sure to include laboratory department involved and names of the laboratory analysts, etc. If CAR is related to the bottle order or quote, please make sure to include bottle order or quote number. If a credit needs to be issued please make sure to include explanation why, prices used, new prices and documentation supporting new prices, such as quotes, previous invoice, etc.

13.4.3 Once the CAR number is assigned, this number must be entered in the comment section of LIMS under Work order / Work orders associated with the CAR.

13.4.4 Every CAR must contain supporting documentation. This documentation must be present for the CAR to be closed. CARs that are missing information or details will be returned to the PM. Complete CARs must be forwarded to the Director of Project Management or Laboratory Manager if Director of Project Management is absent.

13.4.4.1 Examples of supporting documentation are as follows:

13.4.4.1.1 In case of NCR about incorrect prices or invoice please make sure to provide following info: old invoice; Chain of Custody Record (COCR), copy of COC, price quote. If invoice is being changed in the LIMS system please make sure to issue revision note on the cover letter. We are required by TNI and AIHA LAP to document any changes that were made after final copy of the report is mailed to the client. This cover letter is for in-house purposes only unless requested by client. All revised documents must be given to receptionist for rescanning.

13.4.4.1.2 In case of NCR about bottle order or shipping please provide a copy of the bottle order, tracking number and any other documentation that will support the NCR, such as client’s fax, etc.

13.4.5 After all the facts and documents are gathered, they must be turned in to Director of Project

Management or the Laboratory Manager. They will review all the information and come up with the decision that will be recorded under “Description of the Corrective Action”. QA Manager is notified, if QA Action is required. All Project Manager or Customer Service CARs must be closed by the Director of Project Management or his designee within 3 business days.

### 13.5 Exceptionally Permitted Departures from Documented Policies and Procedures

13.5.1 Due to the frequently unique nature of environmental samples, it may be necessary to depart from documented policies and procedures when dealing with the sample(s). When the analyst encounters this type of situation, he presents the problem to his supervisor for advice. The supervisor may elect to discuss it with the Technical Director or have a technical representative contact the client to decide on a logical course of action. Once an approach is agreed upon, the analyst notes it in the raw data folder. This information can then be supplied to the client in the form of a footnote or a case narrative with the report.

### 13.6 Addressing Complaints

13.6.1 Addressing complaints is a normal function of conducting business and a valuable tool to improve services to and relationships with clients. The goal of EETSE Atlanta is to provide expeditious resolution of complaints. At EETSE Atlanta, the supervisor and the management team handle complaints related to sample results. Client Services resolves specific complaints concerning container orders, shipping, expected report dates, and results. This information is documented in LIMS. The procedure used for addressing complaints follows the Corrective Action Report.

13.6.2 In the event that a complaint is related to the laboratory’s compliance with its own policies and procedures, the rules of an accrediting agency, or the validity of data, the Quality Assurance Manager and or Technical Director initiate an internal audit of the areas involved. These personnel document the complaint, audit findings and recommendations.

### 13.7 Immediate and Long Term Corrective Action

Immediate corrective actions are necessary to correct or repair non-conforming equipment and systems. This type of corrective action is usually identified by the section supervisor through the use of calibration checks and QC sample analysis

13.7.1 Long term corrective actions are necessary to eliminate causes of non-conformance. The need for such actions may be identified by audits. Examples of this type of action include:

13.7.1.1 Staff training in technical skills or in implementing the quality assurance program.

13.7.1.2 Rescheduling of laboratory routines to ensure analyses are performed within holding times.

13.7.1.3 Identifying vendors to supply reagents of sufficient purity.

13.7.1.4 Revision of quality assurance system or replacement of personnel.

13.7.2 Various auditing authorities may also initiate a corrective action, when deemed necessary.

13.7.3 For either immediate or long term corrective actions, the steps comprising a closed loop corrective action system are as follows:

13.7.3.1 Define the problem.

13.7.3.2 Assign responsibility for investigating the problem.

13.7.3.3 Investigate and determine the cause of the problem.

13.7.3.4 Determine a corrective action plan to eliminate the problem.

13.7.3.5 Assign and accept responsibility for implementing the corrective action.

13.7.3.6 Establish effectiveness of the corrective action and implement the correction.

13.7.3.7 Verify that the corrective action has eliminated the problem.

13.7.3.8 Update risks and opportunities determined, if applicable

13.7.3.9 Make changes to the management system, if necessary

## 13.8 Responsibility for Document Control

The QA department is responsible for document control for the laboratory. Critical documents include the QA Manual, the SOPs, the Corrective Action forms and reports, internally used forms and information, the training files, the MDL studies, the retention time studies, safety training files, performance evaluation reports, certification correspondence and manuals, audit reports and responses, and traceability certificates.

## 14.0 PERFORMANCE AND SYSTEM AUDITS

### 14.1 Purpose

The purpose of conducting audits is to monitor and verify compliance and overall effectiveness of the QA Program. Communication of audit findings to management is required for timely consideration and implementation of corrective actions.

### 14.2 External Audits

- 14.2.1 External audits are performed when certifying agencies or clients conduct on-site inspections. It is EETSE Atlanta's policy to cooperate fully with certifying agencies. It is also EETSE Atlanta's policy to comply fully with system audits conducted by regulatory agencies and clients.
- 14.2.2 The laboratory is involved in external performance audits conducted semi-annually through the analysis of Performance Testing (PT) samples provided by a third party. EPA performance testing studies have been referred to as Water Pollution Study (WP) and Water Supply Study (WS). Additional PTs including soil studies are analyzed per the requirements of TNI and AIHA LAP.
- 14.2.3 During on-site audits, auditors may come into possession of information claimed as business confidential. A business confidentiality claim is defined as "a claim or allegation that business information is entitled to confidential treatment for reasons of business confidentiality or a request for a determination that such information is entitled to such treatment".

When information is claimed as business confidential, the laboratory must place on, or attach to, the information at the time it is submitted to the auditor, a cover sheet, stamped or typed legend, or other suitable form of notice, employing language such as "trade secret", "proprietary" or "company confidential". Confidential portions of documents must always be clearly identified. Confidential business considerations may be purged of references to client identity by the responsible laboratory official at the time of removal from the laboratory. Sample identifiers may not be obscured from the information.

### 14.3 System Audits

- 14.3.1 It is the responsibility of the QA Manager to plan and organize audits as required by a predetermined schedule and as requested by management. Such audits are carried out by trained and qualified personnel who are, whenever resources permit, independent of the activity to be audited.

Laboratory audits are split into smaller audits that are performed within the calendar year at the specified frequency. Audits are performed monthly, quarterly and annually by the Quality Assurance Manager, the Quality Assurance Officer, Department Managers, or an appointed representative. These audits are performed using the laboratory monthly, quarterly, and annual checklists along various regulatory program checklists.

These audits provide information on whether the management system:

- conforms to the laboratory's own requirements for its management system (including the laboratory activities)
- conforms to the requirements of ISO/IEC 17025:2017 and Assessment Checklists
- is effectively implemented and maintained

Additional audits may be necessary throughout the year to address specific project requirements or issues that arise from other audits. Findings of all audits and their associated corrective actions are presented in management reports and posted to the portal server.

14.3.2 Routine report audits are the responsibility of the laboratory Quality Assurance Manager. The Quality Assurance Manager performs an independent systems review of reports generated by the laboratory.

14.3.2.1 The reviewer is not expected to pursue the correctness of every reference in the file contents, but instead concentrates on the internal consistency of the data package.

14.3.2.2 Areas that are reviewed include the chain-of-custody, correspondence with the analytical request, batch QC status, completeness of any corrective action statements, calculations, format, holding time, sensibility and completeness of the project, and file contents. A list of reports reviewed is maintained in an audit file.

14.3.3 Internal audits are planned and conducted in accordance with a schedule developed by the QA Manager. Unscheduled audits or surveillance are also conducted when senior management deems it necessary. QA Department checklists, which are located on the portal server, are used during these in-house assessments.

14.3.4 The responsible management personnel are required to make all personnel, records, reports and documents available to the audit team.

14.3.5 Responsible management of the areas audited is required to provide prompt corrective action in accordance with the provisions of this manual.

14.3.6 Follow-up audits or surveillance is performed, as required, to verify the implementation of corrective action.

14.3.7 When the required corrective action is not implemented within the specified time period, the QA Manager notifies the Business Unit Manager. A Corrective Action Notice form is used for this purpose. The Business Unit Manager performs any required corrective actions.

14.3.8 Audit planning and findings are recorded and filed as part of the QA records.

14.3.9 At the discretion of the Business Unit Manager, impacted clients are notified in writing if the audit result findings indicate any reported data has been compromised.

#### 14.4 Blind Sample Audits

14.4.1 Blind sample audits are performed through the submittal of QC samples to the analyst along with the sample true values, which are only made known to the analyst after the test is complete. Blind sample audits are carried out by the Quality Assurance Manager, Technical Director, clients and certifying agencies as necessary to assure the laboratory is capable of achieving success with a blind QC sample. For continuing TNI and AIHA LAP accreditation, the laboratory must, on a continuous basis, successfully complete two of the last three consecutive proficiency rounds for a given PT field of testing.



- 14.4.2 In addition to the PT samples submitted to the laboratory through third party vendors, the laboratory may also participate in a company-wide internal PT program to evaluate methods that are not commonly included in the semi-annual PT studies. These studies usually occur between January and February and more frequently if deemed necessary.
- 14.4.3 It is recognized that PT samples are often not representative of "real world" samples either in their form (e.g., vials), content (e.g., multiple target analyte hits), or documentation (e.g., no chain of custody) and, as such, present the laboratory with special challenges.
- 14.4.4 It is the policy of EETSE Atlanta that PT samples are treated as typical samples in the normal production process wherever possible. Further, if PT samples present special or unique problems in the normal production process, then they should be treated differently, as would any special or unique request submitted by any client. Holding time begins when the vial is opened. Full volume PT samples follow normal holding time procedures and storage requirements.
- 14.4.5 Login obtains the normal COC information from the documentation provided with the PT samples with review by QA or other designated staff.
- 14.4.6 Vials are prepared as required in the instruction set provided with the samples. After preparation to full volume, the samples may be spiked, digested, and or concentrated as necessary in a manner similar to normal samples received at the laboratory.
- 14.4.7 The following procedures may be required for the analysis/reporting of PT samples.
  - 14.7.7.1 PT samples will not undergo multiple preparations, multiple runs, multiple methods (unless they are being used to evaluate multiple methods), or multiple dilutions, unless these are the procedures that are normally applied to typical client samples or if a corrective action is in progress for the instrument, batch QC, etc.
  - 14.7.7.2 PT sample(s) will not be subjected to special reviews by operational staff or QA unless this would be normal laboratory practice. To the degree that special report forms or login procedures are required by the PT supplier, it is reasonable that the laboratory would apply special review procedures as would be performed for any client requesting unusual reporting or login processes.
- 14.4.8 Special QC samples can be included in any analytical run.

### 14.5 Quality Systems and LIMS Management Review

At least annually, the Business Unit Manager conducts a formal management review to evaluate the effectiveness of the laboratory's quality systems, management system, and LIMS to ensure their continuing suitability and effectiveness in meeting client and regulatory requirements and to introduce any necessary changes or improvements. During this process, the laboratory identifies opportunities for improvement and implements the necessary actions. Inputs to the management review and opportunities for improvement can be identified by suitability procedural and policy review, fulfilment of objectives, internal and external issues, actions from previous management reviews, internal and external audit findings, corrective actions, recurring issues, suggestions from personnel, feedback from Client Satisfaction Survey, complaints, changes in volume/type of work, adequacy of resources, effectiveness of improvements, training, risk assessment, and Proficiency Test results among others. Following the review, the Quality Assurance Manual or SOPs may be revised to reflect any significant changes made to the quality systems.



- 14.5.1 The quality systems and LIMS management review uses information generated during the preceding year to assess the total laboratory and ensures that routine quality actions taken and reviewed on a quarterly basis are not components of larger systematic concerns. The quarterly review (see section 15) is designed to keep the quality systems current and effective.
- 14.5.2 Significant issues from the following documentation are summarized by the Quality Assurance Manager prior to the review meeting:
- 14.5.3.1 Matters arising from the previous annual review.
  - 14.5.3.2 Prior Quarterly Quality Assurance Reports.
  - 14.5.3.3 Review of report reissue requests.
  - 14.5.3.4 Minutes from prior management and staff meetings
  - 14.5.3.5 Minutes from prior senior management meetings that discuss adequacy of staff, equipment and facility resources.
  - 14.5.3.6 Prior customer service or business development meeting information.
  - 14.5.3.7 Internal and external audits, including computer audits performed during the past year.
- 14.5.4 The annual review can occur anytime during the year. Based upon the annual review, a report is generated by the Quality Assurance Manager. This report includes the following information.
- 14.5.4.1 The date of the review and the names and titles of participants.
  - 14.5.4.2 References to the existing documents and topics that were covered in the review process.
  - 14.5.4.3 Quality system or LIMS changes/improvements that will be made as a result of the review.
  - 14.5.4.4 Decisions and actions shall be documented.
  - 14.5.4.5 The effectiveness of the management system and its processes will be included.
  - 14.5.4.6 Provision for required resources.
  - 14.5.4.7 Needs for change and a schedule including assigned responsibilities for the changes.
- 14.5.5 Following any review, the Quality Assurance Manual or SOPs may be revised to reflect any significant changes made to the quality systems.

#### 14.6 Corrective Action

- 14.6.1 All deficiencies found during audits are reported to the Laboratory Manager, Quality Assurance Manager, and the Technical Director (see Section 15, "Quality Assurance Reports to Management"). The Laboratory Manager, Technical Director, and Quality Assurance Manager agree upon a time frame for correction. The laboratory's response and corrective action procedures are evaluated by the Quality Assurance Manager and when acceptable, are attached to each audit and filed. If issues arise that may require method suspension or restriction, the procedures outlined in Section 13, "Corrective Action," are followed.
- 14.6.2 External audits often require written reports that include proof of correction. The Quality Assurance Manager coordinates the written response to the external auditing facility.
- 14.6.3 Written responses to PT results are required. The response must address the reason for any unacceptable or "Check for Error" result. In some cases it may be necessary for blind QC samples to be submitted to the laboratory to show a return to control.

- 14.6.4 Whenever a laboratory fails a study, it shall determine the root cause for the failure and take any necessary corrective action. If a laboratory fails two out of the three most recent studies for a given PT field of testing, its performance is considered unacceptable under the TNI and AIHA LAP standards for that field. The laboratory shall then need to meet the requirements of initial accreditation. For initial studies, the PT samples shall be analyzed at least 15 days apart. The laboratory must successfully complete two PT studies out of the most recent three rounds attempted for each requested PT field of testing.

## 15.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

### 15.1 Internal Reports

The Quality Assurance Manager submits quarterly reports regarding the status of QA/QC activities to the Business Unit Manager. Section 15.3 lists the minimum content of this report. The Quality Assurance Manager also submits an annual report to the Business Unit Manager.

### 15.2 External Reports

Certain projects under regulatory review require establishment of explicit quality assurance objectives and quarterly summaries of QA conformance and corrective action. The laboratory technical and quality assurance staffs provide the necessary information required to establish quality assurance objectives for particular projects. Once the QA deliverables options are selected for the project, sufficient quality control data will be provided in the individual analytical report to allow a periodic assessment of the overall progress of the project. Upon request, any information or reports needed are provided by laboratory management with review by the QA Manager.

### 15.3 Quarterly and Annual Reports

The quarterly or annual reports to management include the following information.

- 15.3.1 SOP. The report indicates any changes to existing SOPs or any new SOPs.
- 15.3.2 Corrective action reports. The report contains information about any corrective action reports that may have been written during the time period since the last QA report.
- 15.3.3 MDL. Any changes in MDL should be included in the QA report.
- 15.3.4 Audits. The QA report includes the results of any audits performed during the time period since the last report.
- 15.3.5 PE samples. The report includes the results of PE samples analyzed since the last report. The PE report indicates the status of performance as it relates to current laboratory accreditations.
- 15.3.6 Certifications. Changes or additions to the laboratory's certifications are addressed in the reports.
- 15.3.7 The annual report is reviewed and signed by the Business Unit Manager, Laboratory Manager, and the Technical Director. A copy of this report is kept for 5 years.

## 16.0 REAGENT STORAGE AND DOCUMENTATION

### 16.1 Safety and Shelf Life

Reagents are stored with consideration for safety and maximum shelf life. Storage conditions and documentation maintenance status for various classes of reagents are given in Table 16-1 and Table 16-2, and are discussed below.

- 16.1.1 All acids, except those poured into small marked containers for immediate use and those that are standardized for specific purposes, are stored in the original containers in acid storage cabinets.

- 16.1.2 All bases, except those poured into small containers for immediate use and those that are standardized for specific purposes, are stored in the original containers within designated areas or storage cabinets.
- 16.1.3 All flammable solvents, except those poured for immediate use, are stored in original containers in approved, vented, flammable storage cabinets, which are located indoors.
- 16.1.4 Dry reagents are stored in designated cabinets in cool, dry areas. Reactive chemicals, cyanides and sulfides are labeled and isolated from other chemicals.
- 16.1.5 All acids used for metal sample digestions and all solvents used for semi-volatile sample extraction may be tested prior to initial use. Lot numbers used for digestions or extractions are recorded in bound notebooks in the appropriate departments.
- 16.1.6 Reagent blanks are analyzed with each sample batch for all methods, validating the purity of all reagents. All reagent containers are dated when received, and dated and initialed when opened (except high use items consumed in less than one week). Documentation is maintained to provide traceability of the reagents used with the analysis of any batch to specific reagent lot numbers.

**TABLE 16-1**  
**STORAGE OF REAGENTS AND CHEMICALS**

| <u>CHEMICAL REQUIREMENTS</u>                   | <u>STORAGE</u> |
|------------------------------------------------|----------------|
| Concentrated acids and bases                   | 1              |
| Standards for metals analysis                  | 2              |
| Standards for extractable organics             | 3              |
| Standards for volatile organics                | 4              |
| Bulk dry chemicals                             | 5              |
| Working solutions containing organic compounds | 6              |
| Working solutions containing only inorganics   | 7              |
| Flammable solvents                             | 8              |
| Non-flammable solvents                         | 9              |

**Table 16-2**  
**STORAGE REQUIREMENT KEY**

1. Stored in the original containers in acid/base cabinets. All organics must be stored separately.
2. Stored at room temperature in the standards cabinet of the metals department.
3. Stored below 0° C in the department.
4. Neat standards are stored at room temperature in the standard cabinet in the department. Stock solutions and working solutions are stored in the freezer.
5. Bulk reagents are stored at room temperature in reagent storage cabinets located throughout the laboratory.
6. Stored refrigerated at 1-4° C in the department.
7. Stored at room temperature in the department; refrigeration is optional.
8. Stored in solvent cabinets in the organic extraction laboratory.
9. Stored separately from the flammable solvents in cabinets in the organic extraction laboratory.

## 17.0 WASTE DISPOSAL

- 17.1 EETSE Atlanta operates as a conditionally exempt, small quantity generator.
- 17.2 All waste disposal is carried out in accordance with EETSE Atlanta Waste Disposal SOP, HS-03005. These documents include procedures for identification, storage, personnel training, tracking forms, report forms and safety, as well as details of the disposal. Hazardous waste disposal procedures are discussed below.
- 17.3 Hazardous Waste Requirements:
  - 17.3.1 Hazardous waste is stored in non-leaking containers that are in good condition with close-fitting lids. The lids are kept closed when wastes are not being added or removed.
  - 17.3.2 Hazardous waste storage containers are labeled with waterproof labels. The labels specify the words "Hazardous Waste", composition and physical state of the waste, hazardous properties of the waste (e.g., flammable, reactive, etc.), and the name and address of the generator.
  - 17.3.3 Each hazardous waste container is clearly labeled with the date the period of accumulation began. The date is also documented on the Hazardous Waste Tracking Log Form (see Section 17.5.8).
  - 17.3.4 All containers are handled in a way that minimizes the possibility of spills and escape of wastes into the environment.
  - 17.3.5 Wastes are stored in an area that is regularly inspected for deteriorating or leaking containers.
  - 17.3.6 All wastes are segregated during temporary accumulation, storage, and for disposal. Prior to disposal, waste materials are carefully combined into categories or waste streams based upon their compatibility.
  - 17.3.7 The following three types of waste are stored in 55-gallon drums.
    - 17.3.7.1 Halogenated solvents such as methylene chloride (closed cap metal drum)
    - 17.3.7.2 Non-halogenated flammable solvents (closed cap metal drum).
    - 17.3.7.3 Heavy metals or other aqueous wastes except cyanide (poly drum)
  - 17.3.8 All other wastes are stored in the original container or 4-liter glass bottles and disposed of via a "lab pack" (i.e., packed by a disposal company in 55-gallon open top drums).
- 17.4 Sample Disposal (See also EETSE Atlanta SOP HS-03005)
  - 17.4.1 After completion of the analysis, unused sample portions, extracts, or digests are transferred to a central secured storage area until they are disposed. Unless a client requests that the project manager save unused samples, digests, or extracts, disposal from the central storage occurs 30 days after submission for test results.
    - 17.4.1.1 Summary of sample disposal procedure:
      - 17.4.1.1.1 Samples are initially put into labeled bins in the walk-in cooler for 30 days in case client decides to add test(s) that require refrigerated storage. All bins must be labeled. Labels include storage location and date of disposal.
      - 17.4.1.1.2 Sample reporting date is used to initiate the 30 day time period. Samples that were put on hold upon receipt should use the date associated with the earliest reported test result unless otherwise indicated by the client or noted by the project manager.
      - 17.4.1.1.3 When attaching labels to the bin, use both the adhesive on the label as well as a piece of clear tape to ensure the label does not come off.

17.4.1.1.4 Sample Management Supervisor (a.k.a. Bottle Prep Supervisor) maintains a list of bin disposal dates. Supervisor must sign and date this sheet in order for bins to be disposed. No bins are to be disposed of by disposal technician without management approval.

17.4.2 Requests for extended sample, digest or extract storage must be provided by the client to the EETSE Atlanta project manager in writing (contract form) prior to sample receipt. Extended storage may result in the charging of additional fees by the EETSE Atlanta project manager prior to sample receipt. EETSE Atlanta is not responsible for evaporation or other deterioration of samples, extracts, or digests during extended storage periods.

17.4.3 Clients that want the return of samples may pick them up at the laboratory, request shipment by FedEx (at the client's expense for packaged shipping), or utilize any other legal means that they choose. Clients requesting the return of samples should provide detailed shipping instructions.

17.4.4 If a client, by contract, specifies sample disposal by a hazardous waste contractor, the client's name and EPA ID number will be used on the manifest and the client will be invoiced for all disposal-related costs.

17.4.5 Other excess sample portions are composited by the laboratory according to matrix (solids, soils or aqueous). Composited soils, sediments & other solid samples are sub-sampled and analyzed for hazardous waste characteristics (ignitability, reactivity, (releasable cyanide and sulfide), corrosivity (pH), toxicity (TCLP by SW-846 Method 1311) and PCBs). If the pooled sub-sample is characterized as hazardous by any of the hazardous waste characteristics or contains greater than 50 ppm PCBs, the excess sample is disposed of through the use of a hazardous waste contractor. If the pooled sub-sample is not deemed hazardous based upon the results of these tests, the composited excess material is disposed of in an industrial/municipal landfill.

17.4.6 Aqueous samples are neutralized and disposed of via the municipal sewer system, following all discharge requirements outlined in 40 CFR Part 261.3 (a)(2)(iv)(E).

### 17.5 Organic Waste Disposal (See also EETSE Atlanta SOP HS-03005)

17.5.1 Similar waste disposal procedures for samples from the volatile, semi-volatile and GC/HPLC pesticide laboratories are employed at EETSE Atlanta.

17.5.2 All personnel should be familiar with the SOP prior to the disposal of wastes in the laboratory.

17.5.3 EETSE Atlanta is considered as a Conditionally Exempt, Small Quantity Generator under 40 CFR Part 261.5 (a generator who generates no more than 100 kilograms of hazardous waste or 1 kilogram of acute hazardous waste in a calendar month and accumulates no greater than 1000 kilograms of hazardous waste). Hazardous waste storage is limited to quantity and/or accumulation and must comply with RCRA regulations as specified in 40 CFR. These wastes are packaged and separated according to compatible groups (e.g., solvents, acids, etc.)

17.5.4 The pH of the discharged waste MUST be between 5 and 10. If the pH of the discharged waste is out of this range, it is diluted with water or treated with the appropriate acid or base.

### 17.5.5 Apparatus and Equipment

17.5.5.1 Respirator and gloves

17.5.5.2 5-gallon plastic buckets with lids



## 17.5.6 Reagents and Chemicals.

### 17.5.6.1 Marble chips for neutralizing acid waste

## 17.5.7 Procedure

Prior to the disposal of any waste, the Health and Safety Officer provides a sample disposal list to the laboratory employee performing the task. Included in this list is the method of disposal and location of disposal for each sample. The Health and Safety Officer obtains this information from the EETSE Atlanta LIMS system and categorizes the samples as hazardous or non-hazardous.

### 17.5.7.1 The procedure for the collection and disposal of expired organic chemicals and solutions is outlined in the subsequent sections.

#### 17.5.7.1.1 Neat standards are sealed and labeled.

#### 17.5.7.1.2 Expired standards and reagents should be separated from others and stored in a box labeled "Expired". All stock standards, working standards and unused sample extracts are emptied into a properly labeled (contents are listed using the official waste storage labels) 4-L empty solvent bottle or flammable canister as applicable.

#### 17.5.7.1.3 Waste standards or samples containing Silvex (2,4,5-TP), 2,4,5-T, or PCBs are stored separately from other waste standards. These compounds are potential dioxin wastes. All acid herbicide standards or sample waste are stored separately from other wastes.

#### 17.5.7.1.4 HPLC/GC vials containing solvents, standards and extracts are stored in a labeled, 4-liter, empty solvent bottle.

#### 17.5.7.1.5 Wastes are never allowed to accumulate in the laboratory for longer than 3 days. Wastes that are stored for longer time periods are stored in the waste storage room located at the back of the laboratory. All dated waste is disposed of in drums.

#### 17.5.7.1.6 Each drum is labeled according to contents, i.e., chlorinated, non-chlorinated solvents, acid and mercury waste. Acid wastes are stored in the acid waste room that is separate from the solvent waste room.

#### 17.5.7.1.7 All wastes are treated inside the fume hood using appropriate safety equipment such as a respirator, gloves, laboratory coat, and safety glasses.

#### 17.5.7.1.8 The Safety Officer is notified in the event of any leaks or spills of hazardous wastes.

#### 17.5.7.1.9 The waste drums available are:

- Flammable Waste
- Soil Waste
- Acid Waste
- Methylene Chloride Waste
- Neutralized Waste

#### 17.5.7.1.10 Autosampler vials full of sample waste are placed into an empty 4-liter solvent bottle, properly labeled, dated, and stored in waste room, where they are lab-packed.

#### 17.5.7.1.11 High-level organic wastes are treated as hazardous substances and are placed in clearly labeled containers. Full containers are stored in the inorganic waste storage room.

#### 17.5.7.1.12 Containers that have been used for the storage of high level wastes are not reused.



17.5.7.1.13 Soil samples are transferred to 55-gallon drums. When full, a composite sample is analyzed for TCLP and characterized for disposal through the use of a Hazardous Waste Contractor.

17.5.7.1.14 Contents of used VOC vials are neutralized prior to disposal into the sanitary sewer.

17.5.7.2 The neutralization of alkaline or acidic wastes is performed with the following procedure.

17.5.7.2.1 A 5-gallon bucket with a strainer bottom is placed directly into a sink.

17.5.7.2.2 The bucket is filled with 6 to 8 inches of marble chips.

17.5.7.2.3 Pass a generous flow of water through the bucket containing the marble chips.

17.5.7.2.4 The samples are added to the bucket at the same time that the water is flowing allowing the samples to drain through the chips and become neutralized.

17.5.8 The Waste Disposal Logbook is located in close proximity to each drum. The following information is added to the logbook:

EETSE Atlanta WORK ORDER Number

Client Sample I.D. Number

Employee(s) Name(s)

Nature of Disposal

17.5.9 The Health and Safety Officer maintains a separate waste disposal record file. These files contain the master list of samples that have been disposed, TCLP analytical results, raw data, and disposal manifest receipts.

17.6 Inorganic Waste Disposal (See also EETSE Atlanta SOP HS-03005)

The procedure for the collection and disposal of expired inorganic chemicals and solutions is outlined in the subsequent sections.

17.6.1 EETSE Atlanta is considered as a Conditionally Exempt, Small Quantity Generator under 40 CFR Part 261.5 (a generator who generates no more than 100 kilograms of hazardous waste or 1 kilogram of acute hazardous waste in a calendar month and accumulates no greater than 1000 kilograms of hazardous waste). Hazardous waste storage is limited to quantity and/or accumulation and must comply with RCRA regulations as specified in 40 CFR. These wastes should be packaged and separated according to compatible groups (e.g., solvents, acids, etc.). Waste water containing toxic waste from the laboratory that does not exceed 1% of total waste water flow can be disposed of into the sanitary sewer system as specified in 40 CFR part 261.3E.

17.6.2 The pH of the discharged waste MUST be between 5 and 10. If the pH of the discharged waste is out of this range, it is diluted with water or treated with the appropriate acid or base.

17.6.3 Apparatus and Equipment

17.6.3.1 Large polyethylene tank (250 gallon)

17.6.3.2 Latex gloves

17.6.3.3 Stirring rod (glass or wood)

17.6.4 Reagents and Chemicals

17.6.4.1 Soda Ash, sodium carbonate ( $\text{NaCO}_3$ )

## 17.6.5 Procedure

Prior to the disposal of any waste, the Health & Safety Officer provides a sample disposal list to the laboratory employee performing the task. Included in this list is the method of disposal and location of disposal for each sample. The Health and Safety Officer obtains this information from the EETSE Atlanta LIMS system and categorizes the samples as hazardous or non-hazardous.

17.6.5.1 All inorganic aqueous waste is poured into a 250 gallon tank in the disposal room by disposal personnel. When the tank is approximately half full, the solution can be neutralized.

17.6.5.2 Soda Ash is slowly added to the waste solution while it is stirred. The solution will effervesce as the Soda Ash neutralizes the acid in the solution.

17.6.5.3 When the pH of the liquid has been sufficiently neutralized, the waste is drained slowly. The tank is flushed with copious amounts of water.

17.6.5.4 Samples with observed concentrations of measured analyte above the calibration level of the various instruments are treated as hazardous waste. This includes the sample waste generated from the flame AA or ICP instrument. This waste is collected in a storage bottle and is disposed of as an acidic waste when the bottle is filled.

17.6.5.5 High-level inorganic wastes in organic solvents are treated in the following manner:

17.6.5.5.1 The high-level waste is placed into a clearly labeled container. When the container is full, the container is placed into the waste storage room.

17.6.5.5.2 Containers used for the storage of high-level wastes are not reused.

17.6.6 The Waste Disposal Logbook is located in close proximity to each drum. The following information is added to the logbook:

EETSE Atlanta WORK ORDER Number

Client Sample I.D. Number

Employee(s) Name(s)

Nature of Disposal

17.6.7 The Health and Safety Officer maintains a separate waste disposal record file. These files contain the master list of samples that have been disposed, TCLP analytical results, raw data, and disposal manifest receipts.

## APPENDIX I

### WASTE DISPOSAL PROCEDURES

| Waste Type                                                                         | Associated Analytical and Sample Prep Methods | Storage Procedures                                                 | Disposal Procedures                            |
|------------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------|------------------------------------------------|
| Halogenated Solvents<br>Methylene Chloride                                         | Pesticides, Herbicides, BNA, GPC, etc.        | Store in glass bottles, then in drums.**                           | Reclaimed by HW contractor.                    |
| Freon                                                                              | Oil & Grease, Petroleum Hydrocarbons          | Store in glass bottles.                                            | Reclaimed by laboratory.                       |
| Mixed Solvents (Flammable & non-halogenated)                                       | VOC Standards, Herbicides, Pesticides         | Store in glass bottles, then in drums.                             | Disposal by HW contractor.                     |
| All neat standards                                                                 | All analyses                                  | Store in original bottles of glass/plastic bottles, then lab pack. | Disposal by HW contractor (Packed by also)     |
| Heavy Metals Solutions                                                             | Metals, COD, Chloride                         | Store in glass bottles, then in drums.                             | Disposal by HW contractor.                     |
| Acid Solutions                                                                     | Metals, General Inorganics, Extractions       | Store in glass bottles or add to neutralizing chambers.            | Neutralize; sanitary sewer.                    |
| Alkaline Solutions                                                                 | General Inorganics, Extractions               | Store in glass bottles.                                            | Neutralize; sanitary sewer.                    |
| All samples containing Organics or Inorganics exceeding hazardous waste standards* | All analytical groups                         | Store in original bottles or jars in sample custody storage area.  | Return to client or disposal by HW contractor. |

\* Hazardous Waste Characteristics (D001-D017) (40 CFR Part 261), HCN>250 mg/kg, TCLP Toxicity Characteristics (Federal Register, 55FR 11798), March 29, 1990, or contains greater than 50 ppm PCBs.

\*\* Bottles are kept in each laboratory and are periodically moved to the hazardous waste storage area.

## APPENDIX II

## LABORATORY EQUIPMENT PREVENTIVE MAINTENANCE SCHEDULE

|                                                    | Service Interval |   |   |   |    |   |    |                                                        |
|----------------------------------------------------|------------------|---|---|---|----|---|----|--------------------------------------------------------|
| EQUIPMENT ITEM                                     | D                | W | M | Q | SA | A | AN | SERVICE LEVEL                                          |
| <b>ICP-EETSE Atlanta and ICP-MS</b>                |                  |   |   |   |    |   |    |                                                        |
| Pump Tubing                                        |                  |   |   | X |    |   |    | Change                                                 |
| Nebulizer                                          |                  |   | X |   |    |   |    | Clean                                                  |
| Filters                                            |                  |   | X |   |    |   | X  | Inspect - clean or replace.                            |
| Spray Chamber                                      |                  |   | X |   |    |   |    | Clean                                                  |
| Quartz Torch                                       |                  |   |   |   | X  |   |    | Clean and realign.                                     |
| D-Shaped Mirrors                                   |                  |   | X |   |    |   | X  | Inspect - clean or replace                             |
| <b>MERCURY ANALYZER AND AUTOSAMPLER</b>            |                  |   |   |   |    |   |    |                                                        |
| Pump Tubing                                        | X                |   |   |   |    |   | X  | Inspect – replace                                      |
| Standard Cups                                      | X                |   |   |   |    |   | X  | Inspect – replace                                      |
| Drying Tube                                        | X                |   |   |   |    |   |    | Repack                                                 |
| Mixing Coil                                        |                  | X |   |   |    |   |    | Inspect - clean or replace                             |
| Sample Probe                                       |                  |   | X |   |    |   |    | Inspect - clean or replace                             |
| Mercury Lamp                                       |                  |   |   |   |    |   | X  | Clean or replace                                       |
| <b>CONDUCTIVITY METER</b>                          |                  |   |   |   |    |   |    |                                                        |
| Battery                                            |                  |   |   |   |    |   | X  | Check or replace                                       |
| Probe Contacts                                     |                  |   |   |   |    |   | X  | Clean or replace                                       |
| <b>pH METER</b>                                    |                  |   |   |   |    |   |    |                                                        |
| Probe(s)                                           | X                |   |   |   |    |   |    | Check fluid levels and fill                            |
| Connectors                                         | X                |   |   |   |    |   |    | Check for corrosion and clean if necessary             |
| <b>AUTOANALYZER (TRAACS/LACHAT)</b>                |                  |   |   |   |    |   |    |                                                        |
| Pump Platen                                        |                  |   |   |   |    |   | X  | Replace                                                |
| Pump Tubes                                         |                  |   |   | X |    |   |    | Replace                                                |
| Flow Cell                                          |                  |   |   | X |    |   |    | Inspect and clean.                                     |
| Autosampler                                        | X                |   |   |   |    |   |    | Check alignment                                        |
| Cobalt Column                                      |                  |   |   |   |    |   | X  | Inspect for channeling and repack                      |
| <b>BLOCK DIGESTER</b>                              |                  |   |   |   |    |   |    |                                                        |
| Heating Elements                                   |                  |   |   |   |    |   | X  | Replace as needed                                      |
| Thermostat                                         |                  |   |   |   | X  |   |    | Check against calibrated thermometer for accuracy      |
| <b>UV/VIS SPECTROPHOTOMETER</b>                    |                  |   |   |   |    |   |    |                                                        |
| Light Source                                       |                  |   |   |   |    |   | X  | Replace                                                |
| Belt                                               | X                |   |   |   |    |   |    | Check for wear, replace if frayed                      |
| Cuvettes                                           | X                |   |   |   |    |   | X  | Check for scratches and buildup - replace              |
| <b>ION SELECTIVE ELECTRODE</b>                     |                  |   |   |   |    |   |    |                                                        |
| fluid filled probe                                 | X                |   |   |   |    |   | X  | Check fluid level - empty and replace if crystals form |
| solid probe                                        | X                |   |   |   |    |   |    | Check for salt build-up on tip, clean if necessary     |
| <b>BOMB CALORIMETER</b>                            |                  |   |   |   |    |   |    |                                                        |
| Thermometer                                        |                  |   |   |   |    | X |    | Calibrate Thermometer                                  |
| Seals                                              | X                |   |   |   |    |   |    | Check for breaks in seals and replace if needed        |
| <b>GAS CHROMATOGRAPH – SEMIVOLATILES</b>           |                  |   |   |   |    |   |    |                                                        |
| Autosampler System                                 |                  |   |   |   |    |   | X  | Syringe and tubing cleaned – Needles/ tubing replaced  |
| Septa                                              |                  | X |   |   |    |   |    | Replace                                                |
| Column/Injector                                    |                  |   |   |   |    |   | X  | Chance sleeve and cut front of guard column.           |
| Gas Cylinder                                       | X                |   |   |   |    |   |    | Inspect - change when pressure reads <500 psi.         |
| <b>GAS CHROMATOGRAPH - MASS SPEC SEMIVOLATILES</b> |                  |   |   |   |    |   |    |                                                        |

## APPENDIX II

### LABORATORY EQUIPMENT PREVENTIVE MAINTENANCE SCHEDULE

| EQUIPMENT ITEM                          | Service Interval |   |   |   |    |   |    | SERVICE LEVEL                                             |
|-----------------------------------------|------------------|---|---|---|----|---|----|-----------------------------------------------------------|
|                                         | D                | W | M | Q | SA | A | AN |                                                           |
| Column/Injector                         |                  | X |   |   |    |   |    | Change sleeve and cut front of column.                    |
| Septum                                  |                  | X |   |   |    |   |    | Replace                                                   |
| Splitless Disc                          |                  |   |   |   | X  |   |    | Replace                                                   |
| Autosampler                             | X                |   |   |   |    | X |    | Syringe and tubing cleaned<br>Needles and tubing replaced |
| Rough Pump                              |                  |   |   |   |    | X |    | Oil change by HP service                                  |
| Mass Spectrometer                       |                  |   |   |   |    |   | X  | Clean                                                     |
| Gas Cylinder                            | X                |   |   |   |    |   |    | Inspect - Change when pressure reads <500 psi.            |
| Hard Drive                              |                  | X |   |   |    |   |    | Archive                                                   |
| ATOMIC ABSORPTION                       |                  |   |   |   |    |   |    |                                                           |
| Pump                                    | X                |   |   |   |    |   |    | check for leaks and corrosion                             |
| Lamps                                   |                  |   |   |   |    |   | X  | If intensity drops, replace                               |
| Nebulizer                               |                  | X |   |   |    |   |    | Clean, sonicate                                           |
| Tubing                                  | X                |   |   |   |    |   |    | If leaking or weak, replace                               |
| Burner Head                             |                  | X |   |   |    |   |    | Clean, sonicate                                           |
| Bottled Gases                           | X                |   |   |   |    |   |    | Replace if pressure reaches 500 psi.                      |
| Spray Chamber                           |                  |   | X |   |    |   |    | Clean, sonicate                                           |
| GAS CHROMATOGRAPH – VOLATILES           |                  |   |   |   |    |   |    |                                                           |
| Column                                  |                  |   |   |   |    |   | X  | Replace                                                   |
| Septum                                  |                  |   | X |   |    |   |    | Replace                                                   |
| Gas Cylinder                            | X                |   |   |   |    |   |    | Inspect - change when pressure reads <500 psi.            |
| Hydrocarbon/Moisture Trap               |                  |   |   |   |    | X |    | Replace                                                   |
| GAS CHROMATOGRAPH - MASS SPEC VOLATILES |                  |   |   |   |    |   |    |                                                           |
| Column                                  |                  |   |   |   |    |   | X  | Replace                                                   |
| Rough Pump                              |                  |   |   |   |    | X |    | Oil change by HP service                                  |
| Gas Cylinder                            | X                |   |   |   |    |   |    | Inspect - change when pressure reads <500 psi.            |
| Septum                                  |                  |   | X |   |    |   |    | Replace                                                   |
| Transfer Line                           |                  |   |   |   |    |   | X  | Check for leaks                                           |
| GAS CHROMATOGRAPH – ECD                 |                  |   |   |   |    |   |    |                                                           |
| Autosampler                             | X                |   |   |   |    | X |    | Syringe cleaned<br>Needles and tubing replaced            |
| Column                                  |                  |   |   |   |    |   | X  | Replace                                                   |
| Septa                                   |                  |   |   |   |    |   | X  | Replace                                                   |
| Glass Insert                            |                  |   |   |   |    |   | X  | Replace                                                   |
| Gold Disk                               |                  |   |   |   |    |   | X  | Replace                                                   |
| Gas Cylinder                            | X                |   |   |   |    |   |    | Inspect - change when pressure reads <500 psi.            |
| EC Detector(s)                          |                  |   |   |   |    | X |    | Send off for replacement of radioactive nickel foil.      |
| GAS CHROMATOGRAPH – FID                 |                  |   |   |   |    |   |    |                                                           |
| Autosampler                             | X                |   |   |   |    |   | X  | Syringe and tubing cleaned<br>Needles and tubing replaced |
| Column                                  |                  |   |   |   |    |   | X  | Replace                                                   |
| Septa                                   |                  |   |   |   |    |   | X  | Replace                                                   |
| Gas Cylinder                            |                  |   |   |   |    |   |    | Inspect daily, change when pressure reads <500 psi.       |
| Glow Plug                               |                  |   |   |   |    |   |    | Determine if glow is enough to ignite Hydrogen            |

## APPENDIX II

### LABORATORY EQUIPMENT PREVENTIVE MAINTENANCE SCHEDULE

| EQUIPMENT ITEM                                                  | Service Interval |   |   |   |    |   |    | SERVICE LEVEL                                                                 |
|-----------------------------------------------------------------|------------------|---|---|---|----|---|----|-------------------------------------------------------------------------------|
|                                                                 | D                | W | M | Q | SA | A | AN |                                                                               |
| Housing and chimney                                             |                  |   |   |   |    |   |    | Check for rust and corrosion that will cause a short, and clean if necessary. |
| Glass Insert                                                    |                  |   |   |   |    |   | X  | Replace                                                                       |
| Column                                                          |                  |   |   |   |    |   | X  | Replace                                                                       |
| PURGE AND TRAP                                                  |                  |   |   |   |    |   |    |                                                                               |
| Sorbent Trap                                                    |                  |   |   |   | X  |   |    | Change                                                                        |
| Heater Pockets                                                  | X                |   |   |   |    |   |    | Check, replace if defective                                                   |
| Transfer Lines                                                  |                  |   |   |   |    |   | X  | Inspect and replace if needed                                                 |
| Purge Flow                                                      |                  |   |   |   | X  |   |    | Inspect, adjust as needed                                                     |
| TCLP EQUIPMENT                                                  |                  |   |   |   |    |   |    |                                                                               |
| Volatile Rotator                                                | X                |   |   |   |    |   |    | Check rotation ( $\pm$ 30 rpms)                                               |
| Semi-volatiles/Metals Rotator                                   | X                |   |   |   |    |   |    | Check rotation ( $\pm$ 30 rpms)                                               |
| BALANCES                                                        |                  |   |   |   |    |   |    |                                                                               |
| Balances                                                        | X                |   |   |   |    |   |    | Calibrate, service annually                                                   |
| Auto-Pipettors                                                  |                  |   |   | X |    |   |    | Calibrate                                                                     |
| BALANCE WEIGHTS – for daily balance checks                      |                  |   |   |   |    |   |    |                                                                               |
| Set “B” – 10 weights                                            |                  |   |   |   |    |   |    | Verified every 5 years by a body that can prove traceability to NIST          |
| THERMOMETER (CERTIFIED) – for in-house thermometer calibrations |                  |   |   |   |    |   |    |                                                                               |
| HB #28199 (CMI #32478) –1 to 200°C                              |                  |   |   |   |    |   | X  | Certified every 5 years by a body that can prove traceability to NIST         |
| DISSOLVED OXYGEN METER                                          |                  |   |   |   |    |   |    |                                                                               |
| Batteries                                                       | X                |   |   |   |    |   |    | Check for strength, if < 13.20 replace                                        |
| Membrane                                                        |                  |   |   | X |    |   |    | Replace. Sooner if signal will not stabilize                                  |
| Spill housing and stirrer                                       | X                |   |   |   |    |   |    | Clean                                                                         |

The service intervals listed in Appendix II are as follows: D = daily; W = weekly; M = monthly; Q = quarterly; SA = semi-annually; and AN = as needed.



## APPENDIX III LAB EQUIPMENT LIST

| ID No. | Instrument        | Type                           | Manufacturer             | Model         | Serial Number | Age  |
|--------|-------------------|--------------------------------|--------------------------|---------------|---------------|------|
| 1002   | MS-4              | GC                             | HP                       | 6890          | 430021BJ4     | 1999 |
| 1003   | MS-4              | MS                             | HP                       | 5973          | US82311468    | 1999 |
| 1006   | MS-5              | GC                             | Agilent                  | 6850          | US00001050    | 2001 |
| 1007   | MS-5              | MS                             | Agilent                  | 5973          | US94240080    | 2001 |
| 1010   | MS-7              | GC                             | Agilent                  | 6850          | US00001051    | 2001 |
| 1011   | MS-7              | MS                             | Agilent                  | 5973 Network  | US94240092    | 2001 |
| 1015   | MS-8              | MS                             | Agilent                  | 5973          | US94240107    | 2001 |
| 1032   | MS-6              | GC                             | HP                       | 6890          | US00021363    | 1999 |
| 1033   | MS-6              | MS                             | HP                       | 5973          | US80310957    | 1999 |
| 1034   | MS-6              | Auto Sampler                   | Agilent                  | G2614A        | US00807551    | 1999 |
| 1040   | HPLC-1            | Degasser                       | HP                       | G1322A        | JP73017078    | 1999 |
| 1043   | HPLC-1            | Colcom                         | HP                       | G1316A        | DE91609970    | 1999 |
| 1046   | HPLC-1            | Interface                      | HP                       | 35900E        | CNDDQ1250     | 1999 |
| 1129   | TurboVap          | Concentrator                   | Zymark                   | TurboVap II   | TV9909N8714   |      |
| 1187   | MS-9              | GC                             | Agilent                  | 6890N         | US10133113    | 2000 |
| 1188   | MS-9              | MS                             | Agilent                  | 5973 Network  | US10441238    | 2000 |
| 1189   | MS-9              | Auto Sampler                   | Agilent                  | G2614A        | US12419350    | 2000 |
| 1210   | MS-10             | GC/MS                          | Agilent                  | 5973          | US82311282    | 1998 |
| 1211   | MS-10             | GC/MS                          | Agilent                  | 6890          | US00024777    | 1998 |
| 1212   | MS-10             | Autosampler                    | Agilent                  | 7683          | US84302879    | 2001 |
| 1265   | Microscope        | M2 LabScope                    | LW Scientific            | LW 200        | 301473        |      |
| 1305   | Microscope        | Microscope                     | Nikon                    | Y52-T         | 159996        | 2002 |
| 1309   | Microscope        | Microscope                     | Olympus                  | BH2           |               |      |
| 1313   | Microscope        | Microscope                     | Olympus                  | SZ30          |               |      |
| 1503   | MS-12             | 5973                           | HP                       | 5973          | US81221559    | 2003 |
| 1504   | MS-12             | 6890/GC                        | HP                       | 6890          | DE00020822    | 2003 |
| 1505   | MS-12             | Sample Concentrator            | OI Corporation           | 4660          | A350466159    | 2003 |
| 1538   | GC-7              | GC (ECD)                       | Agilent                  | 6890N         | CN10427041    | 2004 |
| 1539   | GC-7              | Tower                          | Agilent                  | 7683          | CN42437159    | 2004 |
| 1602   | MS-7              | Concentrator                   | OI Analytical            | Eclipse 4660  | B421466132P   | 2004 |
| 1604   | SPE               | Speed-Vap III Evaporation Unit | Horizon Tech             | Speed Vap III | 42041         | 2004 |
| 1609   | IC2               | ICS 1000 Ion Chrom. Sys        | Dionex                   | ICS-1000      | 5010499       | 2005 |
| 1620   | MS-13             | GC                             | Agilent                  | 6850N         | US10506012    | 2005 |
| 1621   | MS-13             | MS                             | Agilent                  | 5973N         | US52047399    | 2005 |
| 1674   | GC-8              | GC-8                           | Agilent                  | 6890N         | CN 10609020   | 2006 |
| 1675   | Injector          | Injector (Tower)               | Agilent                  | 7683B         | CN603330862   | 2006 |
| 1676   | ALS Sampling Tray | ALS Sampling Tray              | Agilent                  | G2614A        | CN60638448    | 2006 |
| 1695   | MS-15             | Sample Concentrator            | OI Analytical            | 4660          | D63646651P    | 2006 |
| 1700   | Balance           | #12 Analytical                 | Mettler                  | AL104         | 1227330378    | 2006 |
| 1707   | MS-14             | MS                             | Agilent                  | 5975B VL MSD  | US62714424    | 2006 |
| 1708   | MS-14             | GC                             | Agilent                  | 6890 N        | CN10631084    | 2006 |
| 1709   | MS-14             | Autosampler                    | Agilent                  | 7683B         | CN63835818    | 2006 |
| 1717   | Balance           | #13 Analytical                 | Mettler                  | AL104         | 1227300041    | 2007 |
| 1722   | Stage Micrometer  |                                | Microscope Service, Inc. | L & W         |               |      |
| 1728   | MS-15             | GC                             | Agilent                  | 6850A         | US10710001    | 2007 |
| 1729   | MS-15             | MS                             | Agilent                  | 5973 Inert    | US44610842    | 2007 |

| ID No. | Instrument          | Type                          | Manufacturer          | Model                   | Serial Number   | Age   |
|--------|---------------------|-------------------------------|-----------------------|-------------------------|-----------------|-------|
| 1730   | MS-5                | Concentrator                  | OI Corporation        | Eclipse 4660            | D713466088P     | 2007  |
| 1837   | Microscope          | Meiji PLM Asbestos Microscope | MilesCo Scientific    | ML6130                  | 600091          | 2008  |
| 1838   | MS-13               | Concentrator                  | OI Analytical         | Eclipse 4660            | D807466325P     | 2008  |
| 1849   | Hot Block           | Hot Block                     | Environmental Express |                         |                 | 2005  |
| 1888   | Concentrator        | TurboVap II                   | Zymark                |                         | TV0116N10262    | 2001  |
| 1900   | Turbovap II         | Concentration Workstation     | Caliper Life Sciences | 103187                  | TV0953N15641    | 2010  |
| 1924   | MS-16               | Sampler Concentrator          | OI Corporation        | Eclipse 4660            | E008466762P     | 2010  |
| 1930   | MS-16               | GC                            | Agilent               | 7820A                   | CN10202030      | 2010  |
| 1931   | MS-16               | MS                            | Agilent               | 5975                    | US10200403      | 2010  |
| 1955   | MS-8/GC-19          | Autosampler                   | EST Analytical        | Centurion               | 416080003183    | 2011  |
| 1988   | ICP/MS-Agilent      | ICPMS                         | Agilent               | 7700X Series (G3281A)   | JP11391304      | 2013  |
| 1989   | Autosampler         | ICP/MS Autosampler            | Agilent               | ASX-500 Series (G3286A) | US10167A520     | 2013  |
| 1997   | Sonicator           | Ultrasonic                    | Branson               | 3510R-DTH               | RMC060027670E   | 2000  |
| 1999   | Balance             | Toploader                     | Mettler-Toledo        | PL3002                  | 1227190170      | 2005  |
| 2003   | Balance             | Analytical                    | Mettler Toledo        | AB104-S                 | 1121311765      | 2003  |
| 2004   | Balance             | Toploader                     | Mettler Toledo        | PM4800                  | M86379          | 2004  |
| 2005   | Balance             | Toploader                     | Setra                 | SI 2000S                | 2644872         | 2005  |
| 2006   | COD Reactor         | Block                         | HACH                  | #45600-00               | 9.512E+11       | 2002  |
| 2007   | BOD Incubator       | Refrigerator                  | VWR (Sheldon Mfg.)    | #9110593                | 11055305        | 2002  |
| 2018   | Oven                | Drying                        | Quincy Labs           | 10GC                    | NG1-009030      | 2011  |
| 2020   | Hot Block           | Hot Block                     | Environmental Express | SC154                   | 8826CEWCW789    | 2013  |
| 2021   | Simple Dist         | Distillation Apparatus #1     | Environmental Express | C6000                   | N/A             | 2013  |
| 2022   | Simple Dist         | Distillation Apparatus #2     | Environmental Express | C6000                   | N/A             | 2013  |
| 2036   | VOA Cooler          | Walk-in                       | Commercial Refrig.    | 4G3                     | 5605266         | 2000  |
| 2060   | Electron Microscope | TEM                           | Philips               | EM-420                  | 943206007001    | ~1985 |
| 2063   | BOD Incubator       | Precision                     | Kenmore               | MFU20F3GW7              | 699111788       | 2014  |
| 2065   | Balance             | Analytical                    | Fisher                | Item # ALF64            | N0588330030008P | 2010  |
| 2067   | Balance             | Analytical                    | Mettler               | AE160                   | 0578            | 2002  |
| 2069   | Lachat-3            | Quick Chem QC8500             | Lachat                | Series 2                | 140600001703    | 2014  |
| 2070   | Lachat-3 Pump       | Reagent Pump RP-1500          | Lachat                | SM1135                  | 549285-2        | 2014  |
| 2088   | Water Bath          |                               | Thermo Electric       | 2866                    | 201405          | 2008  |
| 2092   | MS-17               | GC                            | Agilent               | 7890B                   | CN14403051      | 2014  |
| 2093   | MS-17               | MS                            | Agilent               | 5977A                   | US1441M401      | 2014  |
| 2100   | Turbidity Meter     | Turbidimeter                  | Lovibond              | Lot# 7374               | 3078            | 2014  |
| 2101   | MS-17               | Cleaning Module               | Entech                | 3100D                   | 1687            | 2014  |
| 2102   | MS-17               | Oven                          | Entech                | 09-0V6L-12              | 0135            | 2014  |
| 2103   | MS-17               | Diluter                       | Entech                | 4700                    | 0026            | 2014  |
| 2105   | MS-17               | Autosampler                   | Entech                | 7650                    | 0025            | 2014  |
| 2108   | GC-9                | GC                            | Agilent               | 7890B (G3440B)          | CN14483265      | 2015  |
| 2109   | GC-9                | Auto Sampler Tray             | Agilent               | 7693 (G4514A)           | CN14380119      | 2015  |
| 2110   | GC-9                | Tower                         | Agilent               | 7693 (G4513A)           | CN14490172      | 2015  |
| 2111   | GC-9                | ECD (Front)                   | Agilent               | G2397A                  | U26039          | 2015  |
| 2112   | GC-9                | ECD (Back)                    | Agilent               | G2397A                  | U26040          | 2015  |
| 2114   | Autosampler         | IC Autosampler                | Dionex                | AS40-1                  | 96040432        | 1999  |
| 2120   | MS-13               | Autosampler                   | EST Analytical        | Centurion               | CentW502100614  | 2014  |
| 2131   | GC-9                | ECD Cell                      | Agilent               | G2397-60610             | U25762          | 2015  |
| 2143   | Zero Air Generator  | FID                           | Whatman               | 76-803                  | 76-803          | 2013  |

| ID No. | Instrument                     | Type                      | Manufacturer          | Model                     | Serial Number    | Age  |
|--------|--------------------------------|---------------------------|-----------------------|---------------------------|------------------|------|
| 2148   | ICP-OES                        | OES-1                     | Agilent               | 5100                      | MY15120005       | 2015 |
| 2158   | Oven                           | Drying                    | Quincy Lab, Inc.      | S430`5                    | G4-007992        | 2015 |
| 2165   | Oven                           | Drying Oven               | Quincy Labs, Inc.     | GC Series (Cat. S43015)   | G4-008013        | 2015 |
| 2173   | GC-10                          | 6890 GC System            | HP                    | 6890 (G1530A)             | US00006903       | 2015 |
| 2178   | GC-10                          | 6890 Injector             | HP                    | 6890 (18593B)             | 3042A23879       | 2015 |
| 2191   | TKN Block Digestor             | Block                     | Environmental Express | TKN100                    | 2015TKNBC105     | 2015 |
| 2195   | BOD Incubator                  | Refrigerator              | Thermo Scientific     | 815                       | 300033500        | 2015 |
| 2221   | Oven                           | 180L Ovn Gravity          | Fisher                | 151030521                 | 41880516         | 2016 |
| 2225   | Oven                           | 180L Ovn Grvty            | Fisher                | 151030521                 | 41921243         | 2016 |
| 2233   | Spectrophotometer              | SPEC-4                    | Hach                  | DR3900                    | 1669679          | 2016 |
| 2246   | Autosampler                    | for Lachat                | Cetac Technologies    | ASX-520                   | 070570A520       | 2011 |
| 2247   | Dilutor                        | for Lachat                | Lachat                | PDS 200                   | 50700000344      | 2011 |
| 2249   | Balance                        | Precision Advanced        | OHAUS                 | GT 4100                   | 8709             | 2007 |
| 2261   | MS-19                          | Autosampler               | EST Analytical        | Centurion                 | 462071416        | 2016 |
| 2282   | Turbidimeter                   | White Light/Tungsten Lamp | Lovibond              | 194200                    | 3463             | 2016 |
| 2285   | GC-11                          | 7890B GC System           | Agilent               | 7890B (G3440B)            | CN16473170       | 2016 |
| 2286   | GC-11                          | 7890B ALS Tray            | Agilent               | G4567A                    | CN15030021       | 2016 |
| 2291   | Total Organic Carbon           | TOC-3                     | Shimadzu              | TOC-L CPN                 | H54315432055 CS  | 2017 |
| 2292   | TOC Autosampler                | 40 mL                     | Shimadzu              | ASI-L                     | H57415401560 SA  | 2017 |
| 2293   | Mercury (Hg) Digest / Analyzer | HG-2 Soil Combustion      | Nippon                | MS-3000                   | 15740318         | 2017 |
| 2294   | Reagent Module                 |                           | Nippon                | RD-3                      | 13420832         | 2017 |
| 2295   | Liquid Sampler                 | Autosampler               | Nippon                | SC-3                      | 13410578         | 2017 |
| 2296   | Mercury (Hg) Digest / Analyzer | HG-1 CVAA                 | Nippon                | RA-4500                   | 15780180         | 2017 |
| 2298   | MS-18                          | GC                        | Agilent               | 7890B GC                  | CN15173094       | 2017 |
| 2299   | MS-18                          | MS                        | Agilent               | 5977B MSD                 | US1715M029       | 2017 |
| 2300   | MS-18                          | Autosampler               | Agilent               | G4567A                    | CN15250014       | 2017 |
| 2301   | MS-18                          | vacuum pump               | Pfeiffer              | DUO2.5                    | 22032890         | 2017 |
| 2302   | Station 1                      | PLM Hood                  | Plexiglass            | with Hepa-Filter          |                  | 1999 |
| 2303   | Station 2                      | PLM Hood                  | Plexiglass            | with Hepa-Filter          |                  | 1999 |
| 2304   | Station 3                      | PLM Hood                  | Plexiglass            | with Hepa-Filter          |                  | 1999 |
| 2305   | Station 4                      | PLM Hood                  | Plexiglass            | with Hepa-Filter          |                  | 1999 |
| 2306   | Thermo-Anemometer              | Velometer                 | Extech                | AN300                     | Z350828          | 2017 |
| 2307   | Vulcan 84 Auto Metals Digestor | Automated Hot Block       | Questron Technologies | V84-P                     | VU17-1027-V1.1.1 | 2017 |
| 2309   | Flame Atomic Absorption (FAA)  | 240 AA                    | Agilent               | G8431A                    | MY17220002       | 2017 |
| 2311   | Soil TOC Analyzer              | Soil Analyzer             | Shimadzu              | SSM-5000A                 | H52735400079 NK  | 2017 |
| 2317   | Oven                           | Drying                    | Quincey Labs          | 40GC                      | G4-008938        | 2017 |
| 2318   | Centrifuge                     | Clinical                  | IEC                   |                           | 42832385         | 2017 |
| 2320   | MS-4                           | Concentrator              | EST Analytical        | Evolution                 | EV806012517      | 2017 |
| 2321   | MS-19                          | Concentrator              | EST Analytical        | Evolution                 | EV850061517      | 2017 |
| 2322   | MS-5                           | Autosampler               | EST Analytical        | Centurion                 | CENTW597072017   | 2017 |
| 2332   | Balance                        | Analytical                | U.S. Solid            | USS-DBS5                  | USS-DBS1709029   | 2017 |
| 2334   | Evaporator                     | Speed Vap IV              | Horizon Technology    | Speed Vap IV              | 17-0109          | 2017 |
| 2339   | Zero Air Generator             | 3500cc                    | Peak Scientific       | Precision Zero Air 3500cc | 770004350        | 2017 |

| ID No. | Instrument                        | Type                            | Manufacturer               | Model                    | Serial Number    | Age    |
|--------|-----------------------------------|---------------------------------|----------------------------|--------------------------|------------------|--------|
| 2341   | Compressed Air Generator          | Compressor                      | Peak Scientific            | Precision Compressed Air | 770004231        | 2017   |
| 2345   | Hydrogen Generator                | Precision                       | Peak Scientific            | Hydrogen Trace 500 cc    | 770005503        | 2017   |
| 2350   | MS-19                             | GC                              | Agilent                    | 7820A                    | CN1723204        | 2017   |
| 2351   | MS-19                             | MS                              | Agilent                    | 5977B MSD                | US1741R002       | 2017   |
| 2360   | Autosampler                       | ICP/MS Autosampler SPS 4        | Agilent                    | G8410A                   | AU17092619       | 8/2017 |
| 2362   | COD Reactor                       | Digital Reactor Block           | Hach                       | DRB 200                  | 17120C0305       | 2018   |
| 2363   | Energy Dispersive Spectrometer    | EDAX (TEM Detector)             | EDAX (Amtek)               | Octane-T-Plus            | 5480             | 2017   |
| 2364   | High Vacuum Evaporator            | Carbon Coater                   | Denton                     | DV-502A                  | 19664            | 2017   |
| 2367   | Microwave Extractor               | Ethox X                         | Milestone                  | 49380                    | 17122726         | 2018   |
| 2368   | Discrete Analyzer                 | DA-1 rAPID-T                    | Astoria-Pacific            | 4600                     | 4660-1046        | 2018   |
| 2373   | pH Meter                          |                                 | Fisher Scientific          | accumet AE150            | ae95002608       | 2018   |
| 2380   | Discrete Analyzer                 | DA-2 rAPID-T                    | Astoria-Pacific            | 4600                     | 4660-1053        | 2018   |
| 2381   | Balance                           | Analytical                      | U.S. Solid                 | USS-DBS5                 | USS-DBS1803053   | 2018   |
| 2382   | Balance                           | Analytical                      | U.S. Solid                 | USS-DBS5                 | USS-DBS1803045   | 2018   |
| 2394   | Automated Hot Block               | Vulcan 84 Auto Metals Digester  | Questron Technologies      | V84-P                    | VN-1002          | 2018   |
| 2395   | Automated Hot Block               | Vulcan 84 Auto Metals Digester  | Questron Technologies      | V42P                     | VU18-1005-V1.1.1 | 2018   |
| 2396   | Water Bath                        | Coliform Incubator Water Bath   | Thermo Scientific          | TSCOL35                  | 300209073        | 2018   |
| 2397   | Mercury (Hg) Digest / Analyzer    | HG-3 CVAA                       | Nippon                     | RA-4500                  | 17780287         | 2018   |
| 2398   | Pensky Marten Flashpoint Analyzer | Supplier: Lazar Scientific, inc | Stanhope-Seta              | 35000-0 U                | 1053813          | 2018   |
| 2400   | ICP-OES                           | OES-2                           | Agilent                    | 5100                     | MY15500001       | 2018   |
| 2401   | Autosampler                       | CETAC                           | CETAC                      | ASX-520                  | 101525A520       | 2018   |
| 2421   | MS-17                             | Concentrator                    | Entech                     | 7200CTS                  | 1595             | 2014   |
| 2434   | HPLC-1                            | ALS                             | HP                         | G1313A                   | DE65102508       | 2005   |
| 2439   | Auto Titrator                     |                                 | Thermo Scientific          | T910                     | T10147           | 2018   |
| 2440   | Probe                             | ATC Probe                       | Thermo Scientific          | 927007MD                 | WT1-12782        | 2018   |
| 2441   | Electrode                         | ROSS Ultra pH Electrode         | Thermo Scientific          | 8102BNUWP                |                  | 2018   |
| 2442   | Sonicator                         | Dismembrator                    | Fisher Scientific          | F550                     | F1768            | 2018   |
| 2444   | Meter                             | pH Meter Digital Unit           | Thermo Scientific          | VSTAR10                  | V13409           | 2018   |
| 2450   | Waterbath                         | KD Concentration                | Fisher Scientific          | FSGPD20                  | 300207609        | 2018   |
| 2452   | ICP/MS                            | ICP/MS - 2 / 7900               | Agilent                    | 7900                     | SG18404244       | 2018   |
| 2454   | Autosampler                       | MS-12                           | OI Analytical              | 4100 Sample Processor    | D833410620       | 2018   |
| 2455   | MS-16/GC-19                       | Concentrator                    | OI Analytical              | 4760 Eclipse             | A832447935       | 2018   |
| 2458   | Microscope                        | PLM Stereomicroscope            | LW Scientific (Thomas Sci) | Z4 Zoom Stereoscope      | Z4H-BSF7-77SE    | 2019   |
| 2459   | GC-12                             | 6850A GC System                 | Agilent                    | 6850A                    | US10540009       | 2004   |
| 2460   | GC-12                             | 6850A ALS Tray                  | Agilent                    | G2880A                   | CN53821085       | 2004   |
| 2462   | Spectrophotometer                 | SPEC-6                          | Thermo Scientific          | Genesys 30               | 9A1W264118       | 2018   |
| 2464   | Concentrator                      | Turbovap II                     | Zymark                     |                          | 4373             | 2018   |
| 2469   | GC-14                             | 6850A GC System                 | Agilent                    | 6850A                    | US10406012       | 2013   |
| 2470   | GC-14 Autosampler                 | 6850 Autosampler                | Agilent                    | 6850 (G2880A)            | CN14520114       | 2013   |
| 2472   | Centrifuge                        |                                 | International Equip Co     | Model CL                 | 428-18881        | 2009   |

| ID No. | Instrument                  | Type                                 | Manufacturer             | Model                           | Serial Number   | Age  |
|--------|-----------------------------|--------------------------------------|--------------------------|---------------------------------|-----------------|------|
| 2485   | Balance                     | Top Loader                           | RADWAG                   | WTC 2000                        | 485747          | 2010 |
| 2486   | ZHE Tumbler                 | Tumbler                              | Bodine Electric Co       | 42R5BFC1-E3                     | 068UU2038       | 2012 |
| 2487   | Pump                        | GAST Pump                            | GAST                     | DQA-V751-FB                     | 5KA84           | 2018 |
| 2488   | Scale                       | Scale                                | Measure Tex              | PS-102-200                      | 101800034       | 2019 |
| 2490   | Oven                        | Oven for Filtration #2               | Quincy Lab Inc.          | 40GC                            | G4-009651       | 2019 |
| 2491   | Spectrophotometer           | SPEC-7                               | Shimadzu                 | Biospec-1601                    | A1075           | 2019 |
| 2492   | Centrifuge                  |                                      | Damon/IEC Division       | IEC Clinical Centrifuge         | AF0523          | 2015 |
| 2494   | Discrete Analyzer           | DA-3                                 | rAPID-T                  | 4600                            | 4660-1061       | 2019 |
| 2495   | Discrete Analyzer           | DA-4                                 | rAPID-T                  | 4600                            | 4660-1062       | 2019 |
| 2509   | Pump                        | Sample Introduction Pump for FAA-240 | Varian                   | VGA-77                          | 95081021        | 2019 |
| 2512   | Discrete Analyzer           | DA-5                                 | rAPID-T                  | 4600                            | 4660-1067       | 2019 |
| 2514   | Balance                     | Top Loader                           | RADWAG                   | WTC 2000                        | 607423          | 2019 |
| 2515   | Balance                     | Top Loader                           | RADWAG                   | WTC 2000                        | 607428          | 2019 |
| 2522   | Balance                     | Analytical                           | Mettler Toledo           | ML204                           | B110120209      | 2019 |
| 2526   | Balance                     | Analytical                           | Mettler Toledo           | AE240                           | G50492          | 1995 |
| 2527   | Meter                       | Conductivity/pH Meter                | Oakton                   | pH/Con 10 Series                | 101196          | 2010 |
| 2528   | Meter                       | Conductivity/pH Meter                | Oakton                   | pH/Con 10 Series                | 76106           | 2010 |
| 2530   | Flow Meter                  | Flow Meter                           | Restek                   | Pro-Flow 6000                   | RE103967        | 2017 |
| 2531   | Balance                     | Top Loader                           | Radwag                   | WTC2000                         | 607498          | 2018 |
| 2532   | Centrifuge                  | IEC Clinical Centrifuge              | Damon/IEC                | IEC Clinical Centrifuge 4-place | AF 2603         | 2010 |
| 2533   | Flow Meter                  | Flow Meter                           | Pro-Flow                 | 6000                            | RE107496        | 2019 |
| 2535   | GC-15                       | GC Unit                              | Agilent                  | 6850A                           | US10305001      | 2009 |
| 2536   | GC-15 Autosampler           | Autosampler                          | Agilent                  | G2880A                          | CN31220462      | 2009 |
| 2538   | MS-7                        | Autosampler                          | EST Analytical           | Centurion                       | CENTW687040219  | 2019 |
| 2539   | MS-4                        | Autosampler                          | EST Analytical           | Centurion                       | CENTS625040219  | 2019 |
| 2540   | Pump                        | Hi Flow Sampler                      | Gilian                   | HFS 113A                        | 850030          | 2010 |
| 2543   | Titration                   | Autotitrator                         | Thermo Fisher Orion      | Orion T910                      | T10233          | 2019 |
| 2544   | Probe                       | pH Electrode                         | Thermo Fisher            | Ross Ultra                      | 8102BNUWP       | 2019 |
| 2546   | Dilutor                     | LaChat Dilutor                       |                          | DRD                             | A89000-1192     | 2009 |
| 2548   | Pump                        | Vacuum Pump                          | Allegro                  | D-2 Mold Lite                   | 16286           | 2009 |
| 2549   | Automated Soxhlet Extractor | Soxtherm                             | Gerhardt                 | SOX 416                         | 1/8465 19 0009  | 2019 |
| 2551   | Meter                       | pH Meter                             | Mettler Toledo           | SevenEasy pH                    | 1231275091      | 2000 |
| 2555   | TEM Digital Camera          | Digital                              | SIA                      | SIA-L3C                         | ML0081508       | 2016 |
| 2557   | Probe                       | Conductivity                         | Thermo Fisher Orion      | 013005MD                        | 248910-A01      | 2019 |
| 2580   | Bod Incubator               | Incubator                            | Norlake                  | LR1201WWW/0                     | 1502550         | 2020 |
| 2583   | MS-15                       | Autosampler                          | EST Analytical           | Centurion                       | CENTW1726012220 | 2020 |
| 2584   | MS-16                       | Autosampler                          | EST Analytical           | Centurion                       | CENTW727012220  | 2020 |
| 2585   | SPS4 Autosampler            | Metals Autosampler                   | Agilent                  | G8410A                          | AU18164857      | 2020 |
| 2588   | Water Bath                  | Adjustable Temperature               | Fisher                   | FSGPD20                         | 3003855776      | 2020 |
| 2592   | Probe                       | Redox (ORP)                          | Thermo Fisher Scientific | 9180BNMD                        | 248994-A01      | 2020 |
| 2593   | Quanti-Tray Sealer          | Tray Sealer                          | Idexx                    | 89-10894-04                     | QT04545-06-073  | 2020 |
| 2603   | IC-4                        | Ion Chromatograph                    | Thermo-Fisher (Dionex)   | Integrion                       | 20043128        | 2018 |
| 2604   | IC-4 Autosampler            | Autosampler                          | Thermo-Fisher (Dionex)   | AS-AP (P/N 074922 no cooling)   | 20043210        | 2019 |
| 2607   | Nitrogen Generator          | Nitrogen Generator                   | Peak Scientific          | Precision Nitrogen Trace 600cc  | 771053987       | 2020 |



| ID No. | Instrument                         | Type                                       | Manufacturer             | Model                       | Serial Number            | Age  |
|--------|------------------------------------|--------------------------------------------|--------------------------|-----------------------------|--------------------------|------|
| 2608   | TOC-4                              | TOC Analyzer                               | Shimadzu                 | TOC-L CPN                   | H54315332035 CS          | 2017 |
| 2609   | KD Evaporator                      | Solvent Evaporator                         | Organomation             | 16165 (PN12018)             | 63500                    | 2020 |
| 2611   | Rotary Agitator                    | Agitator/Tumbler                           | EETSE Atlanta            | EETSE Atlanta-3000          | N/A                      | 2020 |
| 2612   | Rotary Agitator                    | Agitator/Tumbler                           | EETSE Atlanta            | EETSE Atlanta-3000          | N/A                      | 2020 |
| 2613   | Rotary Agitator                    | Agitator/Tumbler                           | Analytical Testing Corp  | DC-20                       | 5046XFCF0003             | 2020 |
| 2614   | Hot Block                          | Hot Block                                  | Environmental Express    | SC154                       | 2020CECW5369             | 2020 |
| 2616   | Incubator                          | VWR Forced Air 6.3 CF (Type Code 51030020) | VWR                      | Cat# 89511-428              | 42586417                 | 2020 |
| 2618   | Sonicator                          | Ultrasonic Cleaner                         | Hardwarefactorystore.com | JPS-20A                     | None listed              | 2020 |
| 2619   | Rotary Agitator                    | Agitator/Tumbler                           | Analytical Testing Corp  | DC-20                       | 5046XFCF0015             | 2020 |
| 2622   | Microscope                         | LW i4 Infinity Microscope                  | LW                       | i4 Infinity                 | G2020015050              | 2020 |
| 2623   | Microscope Camera                  | Mini Vid USB Microscope Camera             | LW                       | TP 605100                   | C1803140389              | 2020 |
| 2624   | Water Bath                         | Precision Shaking Water Bath               | Thermo Scientific        | GTTSSWB15                   | 300433831                | 2020 |
| 2625   | Rotary Agitator                    | Agitator/Tumbler                           | EETSE Atlanta            | EETSE Atlanta-3000          | N/A                      | 2020 |
| 2626   | Rotary Agitator                    | Agitator/Tumbler                           | EETSE Atlanta            | EETSE Atlanta-3000          | N/A                      | 2020 |
| 2636   | Discrete Analyzer                  | DA-6 rAPID-T                               | Astoria-Pacific          | 4600                        | 4660-1091                | 2021 |
| 2639   | SPS 4                              | Auto Sampler                               | Agilent                  | G8410A                      | AU17092619               | 2020 |
| 2640   | Microscope                         | Zoom Stereo Scope                          | LW-Scientific            | Z4M-BZM7-7LL3               | 20810047                 | 2021 |
| 2656   | Centrifuge                         | Clinical Centrifuge                        | International Equip Co   | CL                          | AA0887                   | -    |
| 2657   | Autosampler                        | Autosampler                                | Agilent                  | SPS 4                       | AU17494209               | 2021 |
| 2669   | HPLC Variable Wave Detector        | Detector                                   | Agilent                  | G1314F                      | DE62974795               | 2021 |
| 2670   | Dissolved O2 probe                 | Dissolved O2 probe                         | YSI                      | 5905                        | 59882                    | 2021 |
| 2672   | Flash Point Tester                 | Electrically-Heated Flash Point Tester     | Koehler                  | K16203                      | K1620310276F             | 2021 |
| 2673   | Analytical Balance                 | Analytical Balance                         | Mettler                  | AE163                       | FNR 38500                | -    |
| 2677   | TDS Manifold #4                    | Manifold                                   | Environmental Express    | M3026P                      | N/A                      | 2021 |
| 2678   | GC-16                              | GC System 6850                             | Agilent                  | 6850A(G2630A)               | US10309007               | 2021 |
| 2680   | Shaking Incubator                  | Shaker                                     | BEING                    | BIS-3                       | 190412422                | 2021 |
| 2683   | Incubator                          | Air Incubator 6.3 CF                       | VWR                      | 89511-428                   | 42758434                 | 2021 |
| 2684   | Oven                               | Oven (Sodium Sulfate)                      | Waring                   | WPO750                      | 4H03 4020                | 2021 |
| 2686   | pH Meter                           | Orion Versa Star Pro (VSTAR)               | Thermo Scientific        | VSTAR-10                    | V17182                   | 2021 |
| 2687   | Microscope Eyepiece Camera         | Microscope Digital Camera                  | Amscope                  | MD500                       | 2105171445               | 2021 |
| 2691   | Shaking Incubator                  | Shaker                                     | Scientific Industries    | SI-G100 GTS-100             | GTS10-1039               | 2021 |
| 2693   | 3180 Autosampler                   | Autosampler for FS 3700                    | OI Analytical            | ASX-280                     | 062118A280               | 2021 |
| 2694   | FS 3700 Analyzer                   | Auto Analyzer (FSA)                        | OI Analytical            | 3700                        | 21G103781                | 2021 |
| 2696   | Mantech Autosampler                | Autosampler Automax 73                     | Gilson                   | Automax 73                  | 192E1172                 | 2021 |
| 2697   | Mantech Conductivity Meter         | Conductivity Meter                         | Jenway by Cole-Parmer    | 4510                        | 80713                    | 2021 |
| 2699   | Titration + Buret Modules          | Titration + Buret                          | Mantech                  | PC-1300-475 / PC-1000-1040  | MT-2E1-1088 / MT-2D1-348 | 2021 |
| 2700   | Interface Module + Stirrer Control | Interface Module + Stirrer                 | Mantech                  | PC-1000-102/4 / PC-1000-388 | MT-2G1-882 / MT-2F1-414  | 2021 |



| ID No. | Instrument                     | Type                            | Manufacturer            | Model                        | Serial Number   | Age  |
|--------|--------------------------------|---------------------------------|-------------------------|------------------------------|-----------------|------|
| 2701   | pH Probe                       | Probe                           | Mantech                 | PCE-80-PH1200D               | 8679            | 2021 |
| 2704   | ORP Probe                      | Probe                           | Mantech                 | PCE-80-OR1002                | 8769            | 2021 |
| 2705   | Leak Detector                  | Leak Detector                   | Restek                  | 28500                        | 113070          | 2021 |
| 2706   | ML BOD Analyzer                | BOD Analyzer                    | SEAL Analytical         | ML V3 200L 4BOD YSI          | 8629            | 2021 |
| 2707   | Probe 1                        | Optical DO Probe - 1            | YSI                     | ProOBOD Probe #626400        | 20K101767       | 2021 |
| 2708   | Probe 2                        | Optical DO Probe - 2            | YSI                     | ProOBOD Probe #626400        | 20K101765       | 2021 |
| 2710   | Probe 4                        | Optical DO Probe - 4            | YSI                     | ProOBOD Probe #626400        | 21D101959       | 2021 |
| 2711   | Meter                          | DO Meter 1                      | YSI                     | ProDIGITAL / ProSolo #626650 | 21A103064       | 2021 |
| 2712   | Meter                          | DO Meter 2                      | YSI                     | ProDIGITAL / ProSolo #626650 | 21A103063       | 2021 |
| 2713   | Meter                          | DO Meter 3                      | YSI                     | ProDIGITAL / ProSolo #626650 | 21A103062       | 2021 |
| 2714   | Meter                          | DO Meter 4                      | YSI                     | ProDIGITAL / ProSolo #626650 | 21A103066       | 2021 |
| 2719   | Sonic Dismembrator             | Sonicator                       | Fisher Scientific       | FB505                        | 123124AT-10-21  | 2021 |
| 2722   | Microscope                     | Zoom Stereo Microscope          | LW Scientific           | Z4                           | Z4B-BSED-7LL3-B | 2021 |
| 2727   | GC Injector/Autosampler        | GC Injector/Autosampler         | Agilent                 | 7683B                        | CN80647118      | 2021 |
| 2728   | GC-17                          | 6850 GC                         | Agilent Technologies    | 6850                         | CN11733003      | 2021 |
| 2729   | GC-18                          | 6850 GC                         | Agilent Technologies    | 6850                         | CN11734006      | 2021 |
| 2730   | GC-19 (MS-8)                   | 6850 GC                         | Agilent Technologies    | 6850                         | CN11734005      | 2021 |
| 2732   | pH Probe                       | ROSS Ultra pH Electrode         | Thermo Scientific       | 8302BNUMD                    | ZQ1-16773       | 2021 |
| 2736   | Autosampler GC-17              | 6850 ALS                        | Agilent Technologies    | G2880A                       | CN72900010      | 2021 |
| 2737   | Autosampler GC-18              | 6850 ALS                        | Agilent Technologies    | G2880A                       | CN73200010      | 2021 |
| 2741   | Peristaltic Pump               | Pump for FS 3700                | Cole-Parmer, Ismatec    | 61010A-1/ISM939E             | M21006598       | 2022 |
| 2742   | Environmental Express Manifold | Distillation                    | Environmental Express   | C6018                        | N/A             | 2022 |
| 2746   | Purge&Trap Autosampler         | VOC Autosampler                 | EST Analytical          | Centurion                    | CENTS844012522  | 2022 |
| 2747   | Purge & Trap                   | Purge&Trap                      | EST Analytical          | Evolution 2                  | EV20248012522   | 2022 |
| 2748   | Air Sampling Pump              | Pump                            | Gilian                  | 5000                         | 20220201001     | 2022 |
| 2754   | Rotary Agitator                | 12-place agitator w/AC motor    | Analytical Testing Corp | DC-20B                       | 585YEBC0008     | 2022 |
| 2756   | TurboVap                       | Evaporation System              | Biotage                 | TurboVap II                  | 212902440       | 2022 |
| 2757   | Hotblock                       | Digestion System                | Environmental Express   | SC154 (150)                  | 2022CECW5697    | 2022 |
| 2771   | Leak Detector                  | Leak Detector                   | Restek                  | 28500                        | 114117          | 2022 |
| 2772   | TKN Block Digestor             | BD50 Block                      | SEAL Analytical         | BD50                         | 5146U01576      | 2022 |
| 2773   | TKN Block Digestor Controller  | BD50/28 Programmable Controller | SEAL Analytical         | N/A                          | 5146U01575      | 2022 |
| 2776   | BOD Probe                      | BOD Probe                       | YSI                     | 626400                       | 21J101932       | 2022 |
| 2790   | BOD Meter                      | DO Meter                        | YSI                     | ProSolo 626650               | 22C103798       | 2022 |
| 2793   | pH probe                       | ROSS Ultra pH Electrode         | Thermo Scientific       | 8302BNUMD                    | AX1-15606       | 2022 |
| 2795   | Sonicator                      | Ultrasonic Cleaner              | Cole-Parmer             | 8892R-DTH                    | QCC 97025417D   | 2022 |
| 2796   | Oven                           | Drying for TS                   | Quincy Lab Inc.         | 40GC                         | G4-011511       | 2022 |
| 2804   | GC-21                          | 8890 GC                         | Agilent Technologies    | 8890 (G3540A)                | CN2105A062      | 2022 |
| 2805   | AS for GC-21                   | 150 vials tray                  | Agilent Technologies    | 7693 (G4514A)                | CN11090043      | 2022 |
| 2806   | Injector for GC-21             | Autoinjector                    | Agilent Technologies    | 7693A (G4513AR)              | CN12090142      | 2022 |

| ID No.               | Instrument                                | Type                                                               | Manufacturer                                 | Model                             | Serial Number                | Age                  |
|----------------------|-------------------------------------------|--------------------------------------------------------------------|----------------------------------------------|-----------------------------------|------------------------------|----------------------|
| 2807                 | Analytical Balance                        | Analytical Balance<br>0.0001gx120g                                 | Torbil                                       | AGCN120                           | 301201217                    | 2022                 |
| 2808                 | MiniRae Lite+PID                          | PID                                                                | Honeywell                                    | MiniRae Lite+<br>PGM 7300         | 590-911302                   | 2021                 |
| 2810                 | pH probe                                  | ROSS Ultra pH<br>Electrode                                         | Thermo Scientific                            | 8302BNUMD                         | AX1-15591                    | 2022                 |
| 2813                 | Conductivity Probe                        | 4-Electrode Cell                                                   | ThermoFisher                                 | THERMO013005MD                    | AT1-20371                    | 2022                 |
| 2817                 | pH probe                                  | Combination pH                                                     | Thermo Scientific                            | Orion 9104BNWP                    | AW1-16426                    | 2022                 |
| 2818                 | HPLC Pump                                 | Pump                                                               | Agilent                                      | G1311A                            | DE62957488                   | 2022                 |
| 2819                 | Conductivity Probe                        | MT-1 Probe                                                         | Mantech                                      | PCE-96-CT1010                     | K10/5MM/141                  | 2022                 |
| 2820                 | Probe 3                                   | Optical DO Probe - 3                                               | YSI                                          | ProOBOD Probe<br>#626400          | 21D100775                    | 2022                 |
| 2821                 | Autoclave                                 | Sterilizer                                                         | Market Forge                                 | STM-EL                            | 76369                        | 2015                 |
| 2826                 | MS-10 AS Tray                             | Autosampler Tray                                                   | Agilent                                      | 7683B, G2614A                     | CN31626009                   | 2022                 |
| 2828                 | Analytical Balance                        | Analytical Balance<br>0.0001gx120g                                 | Torbil                                       | AGCN220                           | 302201254                    | 2022                 |
| 2833                 | MiniRAE 3000+PID                          | PID                                                                | Honeywell                                    | MiniRAE 3000                      | 592-602783                   | 2022                 |
| 2817                 | pH probe                                  | Combination pH                                                     | Thermo Scientific                            | Orion 9104BNWP                    | AW1-16426                    | 2022                 |
| 2818                 | HPLC Pump                                 | Pump                                                               | Agilent                                      | G1311A                            | DE62957488                   | 2022                 |
| 2819                 | Conductivity Probe                        | MT-1 Probe                                                         | Mantech                                      | PCE-96-CT1010                     | K10/5MM/141                  | 2022                 |
| 2820                 | Probe 3                                   | Optical DO Probe - 3                                               | YSI                                          | ProOBOD Probe<br>#626400          | 21D100775                    | 2022                 |
| 2821                 | Autoclave                                 | Sterilizer                                                         | Market Forge                                 | STM-EL                            | 76369                        | 2015                 |
| 2826                 | MS-10 AS Tray                             | Autosampler Tray                                                   | Agilent                                      | 7683B, G2614A                     | CN31626009                   | 2022                 |
| 2828                 | Analytical Balance                        | Analytical Balance<br>0.0001gx120g                                 | Torbil                                       | AGCN220                           | 302201254                    | 2022                 |
| 2833                 | MiniRAE 3000+PID                          | PID                                                                | Honeywell                                    | MiniRAE 3000                      | 592-602783                   | 2022                 |
| <a href="#">2838</a> | <a href="#">TurboVap</a>                  | <a href="#">Evaporation System</a>                                 | <a href="#">Biotage</a>                      | <a href="#">TurboVap II</a>       | <a href="#">222103043</a>    | <a href="#">2022</a> |
| <a href="#">2839</a> | <a href="#">FS 3700 Analyzer</a>          | <a href="#">Auto Analyzer</a>                                      | <a href="#">OI Analytical</a>                | <a href="#">3700</a>              | <a href="#">22E105406</a>    | <a href="#">2022</a> |
| <a href="#">2840</a> | <a href="#">Peristaltic Pump</a>          | <a href="#">Pump for FS 3700</a>                                   | <a href="#">Cole-Parmer, Ismatec</a>         | <a href="#">61010-1/ISM939E</a>   | <a href="#">N/A</a>          | <a href="#">2022</a> |
| <a href="#">2841</a> | <a href="#">3180 Autosampler</a>          | <a href="#">Autosampler for FS 3700</a>                            | <a href="#">OI Analytical</a>                | <a href="#">ASX-280</a>           | <a href="#">072224A280</a>   | <a href="#">2022</a> |
| <a href="#">2842</a> | <a href="#">Distillation Module</a>       | <a href="#">In-line Distillation-Phenol</a>                        | <a href="#">OI Analytical</a>                | <a href="#">A515000</a>           | <a href="#">N/A</a>          | <a href="#">2022</a> |
| <a href="#">2843</a> | <a href="#">Circulator</a>                | <a href="#">Chilled Water Circulator</a>                           | <a href="#">Caron Products</a>               | <a href="#">2050-1-1</a>          | <a href="#">2050-1-1-093</a> | <a href="#">2022</a> |
| <a href="#">2844</a> | <a href="#">Oven</a>                      | <a href="#">180L Ovn Grvty</a>                                     | <a href="#">Fisher</a>                       | <a href="#">151028874</a>         | <a href="#">43095254</a>     | <a href="#">2022</a> |
| <a href="#">2857</a> | <a href="#">Microwave Extractor</a>       | <a href="#">Ethos X</a>                                            | <a href="#">Milestone</a>                    | <a href="#">Ethos X</a>           | <a href="#">22116946</a>     | <a href="#">2023</a> |
| <a href="#">2858</a> | <a href="#">Analytical Balance</a>        | <a href="#">Analytical Balance<br/>0.0001gx120g</a>                | <a href="#">Torbil</a>                       | <a href="#">AGCN220</a>           | <a href="#">302201282</a>    | <a href="#">2023</a> |
| <a href="#">2863</a> | <a href="#">Micro Lab 600 Autodiluter</a> | <a href="#">Autodiluter</a>                                        | <a href="#">Hamilton &amp; OI Analytical</a> | <a href="#">ML 600 / 61502-01</a> | <a href="#">ML600BL17908</a> | <a href="#">2023</a> |
| <a href="#">2864</a> | <a href="#">FSA Autodiluter Valve</a>     | <a href="#">Valve</a>                                              | <a href="#">OI Analytical</a>                | <a href="#">EUH</a>               | <a href="#">EUA26842</a>     | <a href="#">2023</a> |
| <a href="#">2865</a> | <a href="#">COD Reactor</a>               | <a href="#">Digital Reactor Block</a>                              | <a href="#">HACH Company</a>                 | <a href="#">DRB 200</a>           | <a href="#">23010C0187</a>   | <a href="#">2023</a> |
| <a href="#">2866</a> | <a href="#">Fume Hood</a>                 | <a href="#">6' Fisher American Chemical Fume Hood w/ Dual Sash</a> | <a href="#">Fisher American</a>              | <a href="#">6-31-SWNXX-SS</a>     | <a href="#">002357031023</a> | <a href="#">2023</a> |
| <a href="#">2867</a> | <a href="#">pH Meter</a>                  | <a href="#">Orion Versa Star Pro (VSTAR)</a>                       | <a href="#">Thermo Scientific</a>            | <a href="#">VSTAR10</a>           | <a href="#">V20393</a>       | <a href="#">2023</a> |
| <a href="#">2869</a> | <a href="#">pH Meter</a>                  | <a href="#">Orion Versa Star Pro (VSTAR)</a>                       | <a href="#">Thermo Scientific</a>            | <a href="#">VSTAR10</a>           | <a href="#">V20344</a>       | <a href="#">2023</a> |
| <a href="#">2870</a> | <a href="#">pH Probe</a>                  | <a href="#">ROSS Ultra pH Electrode</a>                            | <a href="#">Thermo Scientific</a>            | <a href="#">8302BNUMD</a>         | <a href="#">AP1-16325</a>    | <a href="#">2023</a> |
| <a href="#">2871</a> | <a href="#">pH Probe</a>                  | <a href="#">ROSS Ultra pH Electrode</a>                            | <a href="#">Mantech</a>                      | <a href="#">PCE-80-PH1200D</a>    | <a href="#">9195</a>         | <a href="#">2023</a> |
| <a href="#">2874</a> | <a href="#">pH Probe</a>                  | <a href="#">ROSS Ultra pH</a>                                      | <a href="#">Thermo Scientific</a>            | <a href="#">8302BNUMD</a>         | <a href="#">BY1-17167</a>    | <a href="#">2023</a> |

[illegible]

## APPENDIX IV - Chain of Custody



## Environment Testing

Eurofins Environment Testing Southeast-Atlanta, LLC  
3080 Presidential Drive, Atlanta, GA 30340 Phone: (770) 457-8177

## CHAIN OF CUSTODY

Work Order: \_\_\_\_\_  
Page \_\_\_\_\_ of \_\_\_\_\_

| COMPANY:    |           | ADDRESS:   |      | ANALYSIS REQUESTED |           |                       |                          |  |  |  |  |  |  |  |  | Visit our website<br>www.EurofinsUS.com for<br>downloadable COCs. |  | Number of Containers |  |
|-------------|-----------|------------|------|--------------------|-----------|-----------------------|--------------------------|--|--|--|--|--|--|--|--|-------------------------------------------------------------------|--|----------------------|--|
| PHONE:      |           | EMAIL:     |      |                    |           |                       |                          |  |  |  |  |  |  |  |  | REMARKS                                                           |  |                      |  |
| SAMPLED BY: |           | SIGNATURE: |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| #           | SAMPLE ID | SAMPLED:   |      | GRAB               | COMPOSITE | MATRIX<br>(see codes) | PRESERVATION (see codes) |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
|             |           | DATE       | TIME |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 1           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 2           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 3           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 4           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 5           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 6           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 7           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 8           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 9           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 10          |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 11          |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 12          |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 13          |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 14          |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |

| RELINQUISHED BY:               |  | DATE/TIME: |  | RECEIVED BY:                             |  | DATE/TIME: |  | PROJECT INFORMATION                   |  |  |  | RECEIPT                                                                                                                                                                                                                                                                                    |  |
|--------------------------------|--|------------|--|------------------------------------------|--|------------|--|---------------------------------------|--|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 1.                             |  |            |  | 1.                                       |  |            |  | PROJECT NAME:                         |  |  |  | Total # of Containers                                                                                                                                                                                                                                                                      |  |
| 2.                             |  |            |  | 2.                                       |  |            |  | PROJECT #:                            |  |  |  | Turnaround Time (TAT) Request in Business Days                                                                                                                                                                                                                                             |  |
| 3.                             |  |            |  | 3.                                       |  |            |  | SITE ADDRESS:                         |  |  |  | <input type="checkbox"/> Standard <input type="checkbox"/> 4-Day Rush*<br><input type="checkbox"/> 3-Day Rush* <input type="checkbox"/> 2-Day Rush*<br><input type="checkbox"/> Next Day Rush* <input type="checkbox"/> Other _____<br><input type="checkbox"/> Same-Day Rush* (with req.) |  |
| SPECIAL INSTRUCTIONS/COMMENTS: |  |            |  | SHIPMENT METHOD                          |  |            |  | SEND REPORT TO:                       |  |  |  | * Surcharges apply for Rush TAT                                                                                                                                                                                                                                                            |  |
|                                |  |            |  | OUT: / /      VIA:                       |  |            |  | INVOICE TO (IF DIFFERENT FROM ABOVE): |  |  |  | REGULATORY PROGRAM (if any):                                                                                                                                                                                                                                                               |  |
|                                |  |            |  | IN: / /      VIA:                        |  |            |  |                                       |  |  |  | DATA PACKAGE: I <input type="radio"/> II <input type="radio"/> III <input type="radio"/> IV <input type="radio"/>                                                                                                                                                                          |  |
|                                |  |            |  | Client   FedEx   UPS   US mail   courier |  |            |  |                                       |  |  |  |                                                                                                                                                                                                                                                                                            |  |
|                                |  |            |  | other: _____                             |  |            |  | QUOTE #: _____      PO#: _____        |  |  |  |                                                                                                                                                                                                                                                                                            |  |

Submission of samples to the laboratory constitutes acceptance of EETSE's Terms & Conditions. Client assumes sole responsibility for damage or loss of samples before we accept them. Samples received after 3PM or on Saturday are considered as received the following business day. If no TAT is marked on COC, EETSE-Atlanta will proceed with standard TAT. Samples are disposed of 30 days after completion of report unless other arrangements are made.

Matrix Codes: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water ST = Stormwater WW = Waste Water W = Water (Blanks) DW = Drinking Water (Blanks) O = Other (specify)

2.27.24 COC

Preservative Codes: H+I = Hydrochloric acid + ice I = Ice only N = Nitric acid S+I = Sulfuric acid + ice S/M+I = Sodium Bisulfate/Methanol + ice NaOH=SH O = Other (specify) NA = None

## APPENDIX V

### QUALITY ASSURANCE MANUAL TRAINING SUMMARY (FORM 1)

Quality Assurance Manual Date and Revision Number:

Revision 30; March 27, 2024

Initial each section as reviewed. Please complete and return this form to Technical Director for placement in Employee's Training File:

- \_\_\_\_\_ Section 3.0, Statement of Policy
- \_\_\_\_\_ Section 4.0, Organization
- \_\_\_\_\_ Section 5.0, Quality Assurance Program
- \_\_\_\_\_ Section 6.0, Sample Bottle Preparation
- \_\_\_\_\_ Section 7.0, Custody of Samples, Equipment and Supplies
- \_\_\_\_\_ Section 8.0, Analytical Procedures
- \_\_\_\_\_ Section 9.0, Calibration Procedures and Frequency
- \_\_\_\_\_ Section 10.0, Preventative Maintenance
- \_\_\_\_\_ Section 11.0, Quality Control Checks & Routines to Assess Precision, Accuracy & MDLs
- \_\_\_\_\_ Section 12.0, Data Reduction, Review and Reporting
- \_\_\_\_\_ Section 13.0, Corrective Action and Nonconformances
- \_\_\_\_\_ Section 14.0, Performance and System Audits
- \_\_\_\_\_ Section 15.0, Quality Assurance Reports to Management
- \_\_\_\_\_ Section 16.0, Reagent Storage and Documentation
- \_\_\_\_\_ Section 17.0, Waste Disposal
- \_\_\_\_\_ Appendix I, Waste Disposal Procedures
- \_\_\_\_\_ Appendix II, Lab Equipment Preventive Maintenance Schedule
- \_\_\_\_\_ Appendix III, Lab Equipment List
- \_\_\_\_\_ Appendix VI, Corrective Action Form
- \_\_\_\_\_ Appendix VIII, List of all methods under which lab is Accredited
- \_\_\_\_\_ Appendix X (Outside Reference Documents)

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Print Name: \_\_\_\_\_ Date: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Supervisor: \_\_\_\_\_ Date: \_\_\_\_\_

Technical Director: \_\_\_\_\_ Date: \_\_\_\_\_

Quality Assurance Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## APPENDIX V

## QUALITY ASSURANCE MANUAL TRAINING SUMMARY NON-TECHNICAL (FORM 2)

Quality Assurance Manual Date and Revision Number:  
Revision 30; March 27, 2024

Initial each section as reviewed. Please complete and return this form to Technical Director for placement in Employee's Training File:

\_\_\_\_\_ Section 3.0, Statement of Policy  
\_\_\_\_\_ Section 4.0, Organization  
\_\_\_\_\_ Section 5.0, Quality Assurance Program  
\_\_\_\_\_ Section 6.0, Sample Bottle Preparation  
\_\_\_\_\_ Section 7.0, Custody of Samples, Equipment and Supplies  
\_\_\_\_\_ Section 13.0, Corrective Action and Nonconformances  
\_\_\_\_\_ Section 14.0, Performance and System Audits  
\_\_\_\_\_ Section 16.0, Reagent Storage and Documentation  
\_\_\_\_\_ Section 17.0, Waste Disposal  
\_\_\_\_\_ Appendix I, Waste Disposal Procedures  
\_\_\_\_\_ Appendix VI, Corrective Action Form  
\_\_\_\_\_ Appendix VIII, List of all methods under which lab is Accredited

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Print Name: \_\_\_\_\_ Date: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Supervisor: \_\_\_\_\_ Date: \_\_\_\_\_

Technical Director: \_\_\_\_\_ Date: \_\_\_\_\_

Quality Assurance Manager: \_\_\_\_\_ Date: \_\_\_\_\_



## APPENDIX VI - CORRECTIVE ACTION FORM

**Eurofins Atlanta**  
**Corrective Action Report**

Date Initiated: \_\_\_\_\_ Corrective Action Report ID: \_\_\_\_\_  
Initiated By: \_\_\_\_\_ Department: \_\_\_\_\_

**Corrective Action Description**

CAR Summary: \_\_\_\_\_

Description of Nonconformance: \_\_\_\_\_

Description of Corrective Action: \_\_\_\_\_

Performed By: \_\_\_\_\_ Completion Date: \_\_\_\_\_

**Client Notification**

Client Notification Required: \_\_\_\_\_ Notified By: \_\_\_\_\_

Comment: \_\_\_\_\_

**Quality Assurance Review**

Nonconformance Type: \_\_\_\_\_

Further Action required by QA: \_\_\_\_\_

**Approval and Closure**

Technical Director / Deputy Tech. Dir.: \_\_\_\_\_ Close Date: \_\_\_\_\_

QA Officer Approval: \_\_\_\_\_ QA Date: \_\_\_\_\_



Environment Testing

Clear Save as

**SAMPLE/COOLER RECEIPT CHECKLIST**

1. Client Name: \_\_\_\_\_ Work Order Number: **2403**

2. Carrier: FedEx ☐ UPS ☐ USPS ☐ Client ☐ Courier ☐ Other \_\_\_\_\_

|                                                                                            | Yes                   | No                    | N/A                   | Details                                                                                          | Comments |
|--------------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------|--------------------------------------------------------------------------------------------------|----------|
| 3. Shipping container/cooler received in good condition?                                   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | damaged <input type="checkbox"/> leaking <input type="checkbox"/> other <input type="checkbox"/> |          |
| 4. Custody seals present on shipping container?                                            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                  |          |
| 5. Custody seals intact on shipping container?                                             | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                  |          |
| 6. Cooler temperature(s) within limits of 0-6°C? [See item 12 for temperature recordings.] | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                  |          |
| 7. Chain of Custody (COC) present?                                                         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                  |          |
| 8. Chain of Custody signed, dated, and timed when relinquished and received?               | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                  |          |
| 9. Sampler name and/or signature on COC?                                                   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                  |          |
| 10. Were all samples received within holding time?                                         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                  |          |
| 11. TAT marked on the COC?                                                                 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | If no TAT indicated, proceeded with standard TAT per Terms & Conditions.                         |          |

12. Cooler 1 Temperature \_\_\_\_\_ °C Cooler 2 Temperature \_\_\_\_\_ °C Cooler 3 Temperature \_\_\_\_\_ °C Cooler 4 Temperature \_\_\_\_\_ °C  
Cooler 5 Temperature \_\_\_\_\_ °C Cooler 6 Temperature \_\_\_\_\_ °C Cooler 7 Temperature \_\_\_\_\_ °C Cooler 8 Temperature \_\_\_\_\_ °C

13. Comments: \_\_\_\_\_

I certify that I have completed sections 1-13 (dated initials). \_\_\_\_\_

|                                                                     | Yes                   | No                    | N/A                   | Details                                                                                                                                      | Comments |
|---------------------------------------------------------------------|-----------------------|-----------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 14. Temperature blanks present?                                     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 15. Were sample containers intact upon receipt?                     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 16. Custody seals present on sample containers?                     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 17. Custody seals intact on sample containers?                      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 18. Do sample container labels match the COC?                       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | incomplete info <input type="checkbox"/> illegible <input type="checkbox"/> no label <input type="checkbox"/> other <input type="checkbox"/> |          |
| 19. Are analyses requested indicated on the COC?                    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 20. Were all of the samples listed on the COC received?             | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | samples received but not listed on COC <input type="checkbox"/> samples listed on COC not received <input type="checkbox"/>                  |          |
| 21. Was the sample collection date/time noted?                      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 22. Did we receive sufficient sample volume for indicated analyses? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 23. Were samples received in appropriate containers?                | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 24. Were VOA samples received without headspace (< 1/4" bubble)?    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 25. Were trip blanks submitted?                                     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | listed on COC <input type="checkbox"/> not listed on COC <input type="checkbox"/>                                                            |          |

26. Comments: \_\_\_\_\_

I certify that I have completed sections 14-26 (dated initials). \_\_\_\_\_

**This section only applies to samples where pH can be checked at Sample Receipt.**

|                                                                 | Yes                   | No                    | N/A                   | Details | Comments |
|-----------------------------------------------------------------|-----------------------|-----------------------|-----------------------|---------|----------|
| 27. Have containers needing chemical preservation been checked? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |         |          |
| 28. Containers meet preservation guidelines?                    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |         |          |
| 29. Was pH adjusted at Sample Receipt?                          | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |         |          |

**\*Note:** Certain analyses require chemical preservation but must be checked in the laboratory and not upon Sample Receipt such as Coliforms, VOCs and Oil & Grease/TPH. This also excludes metals by EPA 200.7, 200.8 and 245.1 which will be verified between 16 and 24 hours after preservation.

I certify that I have completed sections 27-29 (dated initials). \_\_\_\_\_

Checklist 7.24.23 Rev 4

**Lock Checklist**

## APPENDIX VIII - List of all methods for which lab is Accredited

| Potable or Drinking Water (Safe Drinking Water Act - SDWA) |              |                         |                                    |
|------------------------------------------------------------|--------------|-------------------------|------------------------------------|
| Matrix                                                     | Category     | Method                  | Description                        |
| PW                                                         | Microbiology | SM9223B                 | Total Coliforms                    |
| PW                                                         | Microbiology | SM9221D                 | E. coli                            |
| PW                                                         | Metals       | EPA 200.8               | Metals                             |
| Non-Potable Water (Clean Water Act - CWA)                  |              |                         |                                    |
| Matrix                                                     | Category     | Method                  | Description                        |
| NPW                                                        | Microbiology | SM9222B                 | Total Coliforms                    |
| NPW                                                        | Microbiology | SM9222D-2015            | Fecal Coliforms                    |
| NPW                                                        | Microbiology | SM9223B-2016            | E. coli                            |
| NPW                                                        | Gen Chem     | EPA 1010                | Ignitability                       |
| NPW                                                        | Gen Chem     | EPA 120.1 and EPA 9050  | Conductivity                       |
| NPW                                                        | Gen Chem     | EPA 160.4               | Residue-volatile                   |
| NPW                                                        | Gen Chem     | EPA 1664B and EPA 9070  | Oil & Grease                       |
| NPW                                                        | Gen Chem     | EPA 180.1               | Turbidity                          |
| NPW                                                        | Gen Chem     | EPA 300.0               | Ion Scan                           |
| NPW                                                        | Gen Chem     | EPA 350.1               | Ammonia as N                       |
| NPW                                                        | Gen Chem     | EPA 351.2               | Kjeldahl nitrogen - total          |
| NPW                                                        | Gen Chem     | NECi N07-0003           | Nitrogen, Nitrate-Nitrite (as N)   |
| NPW                                                        | Gen Chem     | EPA 353.2               | Nitrate as N and Nitrate-nitrite   |
| NPW                                                        | Gen Chem     | EPA 353.2               | Nitrite as N                       |
| NPW                                                        | Gen Chem     | EPA 365.1               | Orthophosphate as P                |
| NPW                                                        | Gen Chem     | EPA 365.1               | Phosphorus total                   |
| NPW                                                        | Gen Chem     | EPA 410.4               | Chemical oxygen demand             |
| NPW                                                        | Gen Chem     | EPA 420.1 and EPA 420.2 | Total phenolics                    |
| NPW                                                        | Gen Chem     | EPA 7196A               | Chromium VI                        |
| NPW                                                        | Gen Chem     | EPA 9010/9014           | Total cyanide                      |
| NPW                                                        | Gen Chem     | EPA 9030/9034           | Sulfide                            |
| NPW                                                        | Gen Chem     | EPA 9040                | pH                                 |
| NPW                                                        | Gen Chem     | EPA 9056                | Ion Scan                           |
| NPW                                                        | Gen Chem     | EPA 9060                | Total organic carbon               |
| NPW                                                        | Gen Chem     | EPA 9065                | Total phenolics                    |
| NPW                                                        | Gen Chem     | SM2310B-2011            | Acidity as CaCO <sub>3</sub>       |
| NPW                                                        | Gen Chem     | SM10200H-2011           | Chlorophylls                       |
| NPW                                                        | Gen Chem     | SM2120B-2011            | Color                              |
| NPW                                                        | Gen Chem     | SM2120F-2011            | Color ADMI                         |
| NPW                                                        | Gen Chem     | SM2320B-2011            | Alkalinity as CaCO <sub>3</sub>    |
| NPW                                                        | Gen Chem     | SM2340B-2011            | Hardness                           |
| NPW                                                        | Gen Chem     | SM2540B-2015            | Residue-total                      |
| NPW                                                        | Gen Chem     | SM2540C-2015            | Residue-filterable (TDS)           |
| NPW                                                        | Gen Chem     | SM2540D-2015            | Residue-nonfilterable (TSS)        |
| NPW                                                        | Gen Chem     | SM2540E-2015            | Residue-Volatile                   |
| NPW                                                        | Gen Chem     | SM2540E-2015            | Fixed Residue                      |
| NPW                                                        | Gen Chem     | SM2540G-2015            | Total, fixed, and volatile residue |
| NPW                                                        | Gen Chem     | SM2540F-2015            | Residue-settleable                 |
| NPW                                                        | Gen Chem     | SM3500Cr B-2011         | Chromium VI                        |
| NPW                                                        | Gen Chem     | SM3500-Fe B-2011        | Ferrous Iron                       |
| NPW                                                        | Gen Chem     | SM4500ClG-2011          | Total residual chlorine            |

| Non-Potable Water (Clean Water Act - CWA) |               |                               |                                            |
|-------------------------------------------|---------------|-------------------------------|--------------------------------------------|
| Matrix                                    | Category      | Method                        | Description                                |
| NPW                                       | Gen Chem      | SM4500CN E-2016 Total Cyanide | Cyanide                                    |
| NPW                                       | Gen Chem      | SM4500CN G-2016               | Amenable cyanide                           |
| NPW                                       | Gen Chem      | SM4500H <sup>+</sup> B-2011   | pH                                         |
| NPW                                       | Gen Chem      | SM4500O H-2016                | Dissolved Oxygen                           |
| NPW                                       | Gen Chem      | SM4500S2 F-2011               | Sulfide                                    |
| NPW                                       | Gen Chem      | SM4500SO3 B-2011              | Sulfite-SO3                                |
| NPW                                       | Gen Chem      | SM5210B-2016                  | Biochemical oxygen demand (BOD)            |
| NPW                                       | Gen Chem      | SM5210B-2016                  | Carbonaceous BOD (CBOD)                    |
| NPW                                       | Gen Chem      | SM5310B TOC                   | Total organic carbon                       |
| NPW                                       | Gen Chem      | SM5540C MBAS Surfactants      | Surfactants - MBAS                         |
| NPW                                       | Gen Chem      | TKN - AMMONIA                 | Organic nitrogen                           |
| NPW                                       | Metals        | EPA 200.7 and EPA 6010        | Metals                                     |
| NPW                                       | Metals        | EPA 200.7                     | Total Phosphorus                           |
| NPW                                       | Metals        | EPA 6010                      | Total Phosphorus                           |
| NPW                                       | Metals        | EPA 200.8 and EPA 6020        | Metals                                     |
| NPW                                       | Metals        | EPA 245.1 and EPA 7470        | Mercury                                    |
| NPW                                       | Ext Organics  | EPA 8015                      | Diesel range organics (DRO)                |
| NPW                                       | Ext Organics  | FL-PRO                        | Total Petroleum Hydrocarbons (TPH)         |
| NPW                                       | Ext Organics  | EPA 610 and EPA 8310          | Polynuclear Aromatic Hydrocarbons (PAHs)   |
| NPW                                       | Ext Organics  | EPA 8315                      | Formaldehyde and Acetaldehyde              |
| NPW                                       | Ext Organics  | EPA 625.1 and EPA 8270        | Semi-Volatile (Base-Neutral-Acid) Organics |
| NPW                                       | Ext Organics  | RSK-175                       | GC Analysis of Gaseous Samples             |
| NPW                                       | Pest-Herb-PCB | EPA 8081                      | Pesticides                                 |
| NPW                                       | Pest-Herb-PCB | EPA 8082                      | Polychlorinated Biphenyls                  |
| NPW                                       | Pest-Herb-PCB | EPA 615 and EPA 8151          | Herbicides                                 |
| NPW                                       | Vol Organics  | EPA 8011                      | EDB & DBCP                                 |
| NPW                                       | Vol Organics  | EPA 8015                      | Gasoline range organics (GRO)              |
| NPW                                       | Vol Organics  | EPA 8015                      | Various Non-halogenated Volatile Compounds |
| NPW                                       | Vol Organics  | EPA 624.1 and EPA 8260        | Volatile Organics                          |

| Solids & Hazardous Materials (Resource Conservation & Recovery Act - RCRA) |          |                   |                           |
|----------------------------------------------------------------------------|----------|-------------------|---------------------------|
| Matrix                                                                     | Category | Method            | Description               |
| Solids                                                                     | Gen Chem | EPA 350.1 in Soil | Ammonia                   |
| Solids                                                                     | Gen Chem | EPA 351.2 in Soil | Kjeldahl nitrogen - total |
| Solids                                                                     | Gen Chem | EPA 365.1 in Soil | Total Phosphorus          |
| Solids                                                                     | Gen Chem | EPA 1010          | Ignitability              |
| Solids                                                                     | Gen Chem | EPA 1030          | Ignitability of Solids    |
| Solids                                                                     | Gen Chem | EPA 1311          | TCLP                      |
| Solids                                                                     | Gen Chem | EPA 1312          | SPLP                      |
| Solids                                                                     | Gen Chem | EPA 7196          | Chromium VI               |
| Solids                                                                     | Gen Chem | EPA 9010/9014     | Total cyanide             |
| Solids                                                                     | Gen Chem | EPA 9030/9034     | Sulfide                   |
| Solids                                                                     | Gen Chem | EPA 9040          | pH                        |
| Solids                                                                     | Gen Chem | EPA 9045          | pH                        |
| Solids                                                                     | Gen Chem | EPA 9050          | Conductivity              |
| Solids                                                                     | Gen Chem | EPA 9056          | Ion Scan                  |
| Solids                                                                     | Gen Chem | EPA 9060          | Total organic carbon      |
| Solids                                                                     | Gen Chem | EPA 9065          | Total phenolics           |

|        |          |          |              |
|--------|----------|----------|--------------|
| Solids | Gen Chem | EPA 9071 | Oil & Grease |
|--------|----------|----------|--------------|

| Solids & Hazardous Materials (Resource Conservation & Recovery Act - RCRA) |               |                 |                                            |
|----------------------------------------------------------------------------|---------------|-----------------|--------------------------------------------|
| Matrix                                                                     | Category      | Method          | Description                                |
| Solids                                                                     | Gen Chem      | EPA 9095        | Paint Filter Liquids Test                  |
| Solids                                                                     | Gen Chem      | Sec. 7.3 SW-846 | Reactive cyanide                           |
| Solids                                                                     | Gen Chem      | Sec. 7.3 SW-846 | Reactive sulfide                           |
| Solids                                                                     | Metals        | EPA 6010        | Metals                                     |
| Solids                                                                     | Metals        | EPA 6020        | Metals                                     |
| Solids                                                                     | Metals        | EPA 7471        | Mercury                                    |
| Solids                                                                     | Metals        | EPA 7473        | Mercury                                    |
| Solids                                                                     | Ext Organics  | EPA 8015        | Diesel range organics (DRO)                |
| Solids                                                                     | Ext Organics  | FL-PRO          | Total Petroleum Hydrocarbons (TPH)         |
| Solids                                                                     | Ext Organics  | EPA 8310        | Polynuclear Aromatic Hydrocarbons (PAHs)   |
| Solids                                                                     | Ext Organics  | EPA 8315        | Formaldehyde                               |
| Solids                                                                     | Ext Organics  | EPA 8270        | Semi-Volatile (Base-Neutral-Acid) Organics |
| Solids                                                                     | Pest-Herb-PCB | EPA 8081        | Pesticides                                 |
| Solids                                                                     | Pest-Herb-PCB | EPA 8082        | Polychlorinated Biphenyls                  |
| Solids                                                                     | Pest-Herb-PCB | EPA 8151        | Herbicides                                 |
| Solids                                                                     | Vol Organics  | EPA 8015        | Gasoline range organics (GRO)              |
| Solids                                                                     | Vol Organics  | EPA 8015        | Various Non-halogenated Volatile Compounds |
| Solids                                                                     | Vol Organics  | EPA 8260        | Volatile Organics                          |

| Matrix          | Category     | Method     | Description       |
|-----------------|--------------|------------|-------------------|
| Air & Emissions |              |            |                   |
| Air             | Vol Organics | EPA TO-14A | Volatile Organics |
| Air             | Vol Organics | EPA TO-15  | Volatile Organics |

| AIHA LAP Methods |              |                            |                                    |
|------------------|--------------|----------------------------|------------------------------------|
| Matrix           | Category     | Method                     | Description                        |
| Air              | Metals       | NIOSH 7300M/7303           | Elements by ICP                    |
| Solids           | Metals       | NIOSH 7082                 | Lead in Paint                      |
| Solids           | Metals       | SW3050B/7000B              | Total Lead in Solids               |
| Air              | Metals       | NIOSH 7082                 | Lead on Wipes                      |
| Air              | Asbestos     | NIOSH 7400                 | PCM                                |
| Air              | Microbiology | Fungal Air Direct Exam     | MB - 15019, MB - 15022, MB - 15028 |
| Air              | Microbiology | Fungal Bulk Direct Exam    | MB - 15020                         |
| Air              | Microbiology | Fungal Surface Direct Exam | MB - 15020                         |

## Quality Assurance Manual Acceptance Agreement

The information in this Quality Assurance Manual including its tables, appendices, figures, and / or attachments may be legally privileged and is confidential information intended for the use of reviewing Eurofins Environment Testing Southeast, LLC., Atlanta Quality System policies and procedures. You are hereby notified that any dissemination, distribution, or copy of this manual or information therein including tables, appendices, figures, and / or attachments is strictly prohibited without written permission from a representative of Eurofins Environment Testing Southeast, LLC, Atlanta Customer Service Department. If you have received this manual in error, please notify Eurofins Environment Testing Southeast, LLC, Atlanta Customer Service by telephone at (770) 457-8177 for instructions on returning the document. If an electronic copy has been received in error by email, contact Eurofins Environment Testing Southeast, LLC, Atlanta Customer Service Department and delete the message. Thank you.

SOP No. QA-01000

Date Revised  
March 27, 2024

Revision No.  
30

I have read, understood and agree to comply with the above statement.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Company

\_\_\_\_\_  
Phone Number with extension



## New Employee Initial Quality Assurance Manual Training

TRAINING: Initial Training on EETSE Atlanta SOP No. QA-01000,  
“SOP for the Quality Assurance Manual”

My signature confirms that I attended the initial training of the company’s Quality Assurance Manual, which includes a discussion of the various sections contained within as well as responsibilities I have while performing my daily duties. I will be reading various sections of that document according to my job function. Upon completion I will sign-off on form ‘[Appendix V](#) – Quality Assurance Manual Training Summary’.

Supervisor: \_\_\_\_\_

Section/area: \_\_\_\_\_

Print Name: \_\_\_\_\_

Employee Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## APPENDIX IX - Training Form 2

## Employee SOP / QA Manual Training &amp; Retraining Form

SOP and/or Training Description: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

My signature confirms that I was explained the reasons for this training/retraining and I have read/reviewed sections of the SOP, where applicable, along with other appropriate information including Interim Change Notices (ICNs), spreadsheets, logbook pages, sections in LIMS, calculations, and other forms as they apply. Further, I understand my responsibilities to follow the items presented in this training/retraining as they pertain to my job.

Supervisor: \_\_\_\_\_

Section/area: \_\_\_\_\_

Print Name: \_\_\_\_\_

Employee Signature: \_\_\_\_\_

Date: \_\_\_\_\_

QUALITY ASSURANCE MANUAL  
STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT

Name (Printed): \_\_\_\_\_

SOP Title: Quality Assurance ManualSOP Number: QA-01000 **Rev. No. 30**

The laboratory analyst signature on this approved SOP signifies the following: The analyst has read the SOP in its entirety and has read the analytical methods referenced in the SOP.

The analyst understands that the SOP is to be followed explicitly. Any deviation from the SOP must be noted in writing. Furthermore, the deviation from the SOP must be approved in writing by the laboratory supervisor and the QA staff prior to the analyst's adoption of the deviation from the SOP.

The controlled electronic of this SOP is located on the portal server at: Documents: Quality Assurance: QA Manuals: QA Manual: [2024\\_QA\\_Manual\\_Rev\\_30.pdf](#). If a hard copy is desired, you may request one from the Supervisor.

*Do not make a copy or print out the QA Manual yourself. Printed copies are uncontrolled documents.*

Print Name: \_\_\_\_\_

Date: \_\_\_\_\_

Analyst's Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Department Manager Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Technical Director's Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## APPENDIX XI

### Outside Reference Documents

The company's list of Outside Reference Documents is now identified as our Document Registry Excel file available on our company portal: \\192.0.0.190\l2\Technical\_Mng2\Procedures\Registry.

## APPENDIX XII

### Environmental Microbiology Laboratory Accreditation Program (EMLAP) Specific Requirements

#### 1.0 INTRODUCTION

Eurofins Environment Testing Southeast, LLC., Atlanta (EETSE Atlanta) is dedicated to providing quality analytical services. EETSE Atlanta specializes in the analysis of microorganisms commonly detected in air (e.g., spore trapping), surface (e.g., tape lifts, swabs, wipes), and bulk (e.g., wallboard, carpet, building materials) samples collected from schools, hospitals, offices, industrial, agricultural, and other work environments. EETSE Atlanta has implemented a quality assurance and quality control (QA/QC) program to establish quality control standards necessary for compliance to guidelines by The American Industrial Hygiene Association's Laboratory Accreditation Program (AIHA LAP) Environmental Microbiology Laboratory Accreditation Program (EMLAP). In order to consistently maintain high standards of precision and accuracy in analytical testing, EETSE Atlanta participates in AIHA LAP's Proficiency Analytical Testing (PAT) program.

This quality assurance plan will establish the procedures that will be followed to ensure accuracy, precision, completeness, and representation of data obtained from the analysis of environmental microbiology samples.

#### 2.0 PURPOSE

EETSE Atlanta has implemented a quality assurance, quality control program for the purpose of providing a baseline of standards which will allow for a continuous surveillance quality performance for the benefit of AIHA LAP EMLAP compliance, client satisfaction, and minimization of liability.

#### 3.0 SCOPE

This QA/QC program provides the necessary guidelines to secure and maintain:

- High level of quality work
- Comprehensive accountability of all activities relevant to laboratory services.
- Continuous compliance with ISO/IEC 17025 and AIHA LAP's EMLAP quality requirements.

This QA/QC program includes the following information:

- Comprehensive system of daily, weekly, monthly, and annual record keeping.
- Definition of routine monitoring activities.
- Sampling techniques for air, surface, and bulk collection.
- Sampling Equipment
- Calibration of Sampling Equipment
- Analysis of Air, Surface, and Bulk samples.
- Analytical Equipment

- Calibration of Analytical Equipment
- In-House training of analysts.
- QA/QC activities within lab.

#### 4.0 FACILITIES

The laboratory has adequate facilities for the scope of services and meets the requirements for the most current and relative biosafety guidelines set forth by CDC, WHO, and AIHA LAP. The lab has a documented routine monitoring program for the verification of adequate contamination control. The laboratory has the proper facilities for biological and chemical storage and disposal of refuse.

#### 5.0 EQUIPMENT

##### Microscope/Magnification System

- Microscope/Magnification System consisting of Compound optical microscope with a high magnification (100x) oil immersion objective having a numerical aperture (n.a.) of at least 1.25.
- Alignment of each microscope shall be documented with each day of use.
- Each microscope shall have an ocular micrometer that shall be checked annually with a NIST traceable stage micrometer.
- Field of View Diameter for each objective on the microscope shall be checked annually.

##### Class II Biological Safety Cabinet

- Performance certified annually according to NSF Standard 49.

##### Steam Sterilizer/Autoclave

- An autoclave with functioning temperature and pressure gauges for the disposal of potentially viable waste.
- Routine use of indicators to document successful sterilization with each use.
- Routine use of biological indicators to document the sterilization process.

##### Incubators and Refrigerators

- Temperature settings appropriate for the scope of testing.
- Temperatures recorded twice daily.

#### 6.0 PERSONNEL

The laboratory conforms to the personnel requirements of the AIHA LAP EMLAP guidelines. In all cases training records for degreed laboratory staff shall include a copy of transcript or diploma from an accredited college/university.

##### Technical Manager

- The laboratory shall be under the overall direction of an onsite, qualified person, who for the purposes of this document, is designated as the Technical Manager, and has the responsibility for the function, administration, and day-to-day operation of the laboratory. The Technical Manager or designee shall serve as the approved signatory.
- The Technical Manager shall have an earned microbiology or life science degree, minimally at the baccalaureate level, with the required combination of semester hours in microbiology and/or non-academic work experience as listed below. All non-academic work experience and coursework must be documented in the employee's training and personnel files.

- (a) Microbiology degree and a minimum of two (2) years of full time equivalent documented environmental microbiological work experience (bacteriology and/or mycology).
- (b) Life Science degree and:
- i. Twenty (20) semester hours in Microbiology and a minimum two (2) years of full time equivalent documented environmental microbiological work experience (bacteriology and/or mycology).
  - ii. Sixteen (16) semester hours in Microbiology and a minimum three (3) years of full time equivalent documented environmental microbiological work experience (bacteriology and/or mycology).
  - iii. Twelve (12) semester hours in Microbiology and a minimum four (4) years of full time equivalent documented environmental microbiological work experience (bacteriology and/or mycology).
  - iv. Eight (8) semester hours in microbiology and a minimum of five (5) years of full time equivalent documented environmental microbiological experience (bacteriology and/or mycology).
- (c) Experience must reflect the scope of work of the laboratory.
- The Technical Manager shall be experienced in the selection and the use of bioaerosol, surface, fluid, and raw material sampling methods and in sample processing for the quantification and identification appropriate to the FoTs of mesophilic and thermophilic bacteria, and mesophilic, xerophilic, thermo tolerant fungi (molds and yeasts), and fungi identified by spore trap collection methods.
  - Training records for the Technical Manager shall include documentation of ability to identify genus/group of fungi from spore trap analysis and genus/species of fungi that are reported.
- Laboratory Analytical Staff
- The environmental microbiological program distinguishes two titles for those conducting analytical procedures within the laboratory. An analyst is one who has a bachelor's degree and a technician is one who does not have a degree.
- Laboratory Technicians
- These staff members shall have a high school diploma or General Education Development (GED) During this required training period, the trainee shall perform work (and have work reviewed prior to release) under the direct supervision of a qualified technician, analyst and/or the Technical Manager.
  - Technicians may function in the same manner as analysts for Air – Direct Examination (spore trap) analysis after completion of six (6) months documented on the job training and demonstrated proficiency. For all other analyses, technicians may function in the same manner as analysts after one (1) year documented on the job training and demonstrated proficiency.



## Laboratory Analysts

- These staff members shall have a bachelor's degree in a physical or biological science. Analysts shall have three (3) months of documented training for Air - Direct Examination (spore trap) and six (6) months of documented on-the-job training functioning for all other analyses as an analyst trainee. During the required analyst training period, the trainee shall be under the direct supervision of another qualified analyst and/or the Technical Manager. During this period, the trainee shall have all work reviewed prior to release by another qualified analyst and/or the Technical Manager. Training records for technicians and analysts shall include documentation of ability to identify genus/species of fungi and genus/group of fungi that are reported. Bacterial identification training records shall document training of relevant diagnostic procedures (e.g., gram stain, oxidase, biochemical reactions).

- All analysts and technicians shall have demonstrated ability to produce reliable results through accurate analysis of certified reference materials (CRMs), proficiency testing samples or in-house quality control samples. This demonstration shall be performed and documented at a minimum of every six (6) months.
- Laboratory Quality Assurance Coordinator

- This Quality Assurance Coordinator (QAC) of the laboratory shall possess a bachelor's degree in an applicable basic or applied science and have six (6) months of non-academic relevant and documented microbiological laboratory analysis experience. In lieu of bachelor's degree, four years of non-academic analytical experience is acceptable.
- The QAC shall have training in statistics. Additional training may consist of quality control procedures.

## 7.0 ANALYTICAL METHODS: See SOP's

## 8.0 QUALITY ASSURANCE/QUALITY CONTROL

- Routine QA/QC procedures shall be an integral part of the laboratory procedures and functions. The laboratory is in compliance with APHA-AWWA-WPCF guidelines in *Standard Methods for the Examination of Water and Wastewater*, current edition, for microbiology laboratories.
- Five (5) percent intra-analyst analysis shall be completed by each analyst to assess the precision of the analyst.
- Five (5) percent inter-analyst analysis shall be completed to assess the accuracy of the analysis performed within the laboratory.
- The laboratory shall use control charts or databases to compare intra- and inter-analyst analysis performance to established control charts.
- The laboratory shall ensure the quality control of culture media and analytical reagents per lot number for appropriate sterility, microbial growth, and/or analytical reactions. Records will be maintained and acceptance criteria will be documented.
- Acceptance Criteria on 5% replicate and duplicate analysis, daily reference slide analysis (spore traps) and monthly reference culture analysis will be documented and shall include the following:
  - (a) Taxon identification acceptability
  - (b) Taxon abundance ranking acceptability

(c) Count of concentration acceptability determined statistically with use of control charts or databases (Spore Traps only).

- Laboratory will maintain routine records of temperature documentation for refrigerators and incubators. Acceptance criteria will be documented.
  - The laboratory maintains a microbial culture collection of common organisms relevant to the methods performed. Cultures will be from recognized sources including EMPAT rounds. The culture collection will include the source and date of acquisition.
  - The culture collection will be used monthly to prepare blind cultures to be used as part of the routine QC program to monitor accuracy in culture identification.
  - The laboratory has a reference slide collection with various count levels and genera/groups of spores which is maintained and used as part of total spore analysis quality control.
  - Each day of analysis, at least one slide from the collection shall be reviewed by each analyst. Slides are viewed on a rotational schedule so a different slide is viewed each day until the entire slide collection is examined. Analysis of these slides is incorporated into the daily QC plan. Acceptance criteria documented.
  - Statistically derived control charts with control limits are used to assess performance.
  - The laboratory participates and has documentation of a round robin slide exchange of real samples consistent with AIHA LAP Policy 6A.3.2 *Requirements for Round Robin Programs*.
  - Round robins include the participation of three (3) laboratories. Round robin program will consist of at least two (2) rounds per year, with each round completed within a 6-month timeframe.
  - Each round will consist of four (4) samples at varying concentrations.
  - Each analyst within the lab will analyze samples independently and each analyst's results will be reported.
  - The round robin data will include raw counts and final concentrations for each fungal structure observed.
  - Round Robin acceptance criteria shall include the organism identification, ranking, and quantification.
  - A designated laboratory shall be responsible for data collection and distribution. The participating laboratories shall rotate this designation.
  - A routine air monitoring program is used to verify adequate contamination control.
- (a) Two (2) spore trap samples are collected each month. One (1) inside sample and One (1) outside sample are collected and compared. Acceptance criteria will be documented.

#### SAFETY, HEALTH, ENVIRONMENTAL AND TRANSPORTATION REGULATIONS

EETSE Atlanta adheres to all applicable federal, state, and local regulations regarding safety, health, environment or transportation. Potentially viable microbial waste shall be collected in properly designated biohazard containers and disposed of properly through autoclaving.

## Attachment 4

### EUROFINS ENVIRONMENT TESTING SOUTHEAST, LLC. Atlanta ANNUAL MANAGEMENT REVIEW

#### REQUIRED PARTICIPANTS:

**Business Unit Manager (BUMa)**

QA Manager

PCM Manager

Sample Rec. Manager

Micro Bio Lab Manager

Volatiles Lab Manager

Wet Chem Lab Manager

PLM Manager

Filtration Manager

**Laboratory Manager**

Technical Director

Metals Lab Manager

Semi-Volatile Lab Manager

Customer Service Manager

IC Manager

TEM Manager

General Chemistry Manager

Volatile Air & Soil Manager

The review will be conducted by the BUMa with the assistance of the Quality Assurance Manager.

#### AGENDA

1. Follow Up-Actions from previous Management Review meetings.
  - a. Changes in Policy and Procedures (QA)
  - b. Facility Improvements (BUMa)
2. Quality Assurance Report:
  - a. Accreditation Requirements (QA)
  - b. Changes in Management Structure (Laboratory Manager)
  - c. Changes/Expansion of laboratory Services (BUMa)
  - d. New/Updates of Procedures/SOP's/Reference Materials (QA)
  - e. Outcomes to the Assurance of the Validity of Results from
    - i. Internal QC Samples; Certified or Second source Reference Materials
    - ii. Proficiency Tests
    - iii. Replicate Testing
    - iv. Correlation of Results for different sample tests (e.g. COD / BOD ratio)
  - f. Results of Risk Identification
3. Review of Performance in Quality Areas
  - a. Handling of failed QC Data: Each Department Supervisor provide an overall statement of finding these errors and how they are being handled in their department as they relate to the items listed. How the lab control listed affected Quality Control Performance if relative (e.g. Pipettor EETSE Atlanta 1234 was received in April. Quarterly checks were noticeably tighter than the +/-2% acceptance criteria listed on the sheet.)
    - i. General Quality Assurance (indicate ability of the equipment to meet verification frequency requirements)
      1. Balance Performance:
      2. Pipettor Performance:
      3. Hotblock Temperature Checks:

## Environment Testing

4. Thermometer Verifications:
5. Incubator Temperature Checks:
6. Annual QC Acceptance Limits Update:
7. Annual Reporting Limit Verification:
8. Annual MDL Studies (where applicable):
9. Other:

### ii. Metals:

1. Balance Performance:
2. Pipettor Performance:
3. Annual QC Acceptance Limits Update:
4. Annual Reporting Limit Verification:
5. Annual MDL Studies (where applicable):
6. Linear Calibration Range Studies:
7. Quarterly Pb Contamination Checks:
8. New Personnel:
9. Other (Annual vs. Quarterly IDL Check):

### iii. Metals Prep:

1. Balance Performance:
2. Pipettor Performance:
3. Hotblock Temperature Checks:
4. Annual Reporting Limit Verification:
5. Annual MDL Studies (where applicable):
6. New Personnel:
7. Other:

### iv. Wet Chemistry:

1. Equipment Performance
2. Hotblock Temperature Checks:
3. Pipettor Performance:
4. Balance Performance:
5. Annual QC Acceptance Limits Update:
6. Annual Reporting Limit Verification:
7. Annual MDL Studies (where applicable):
8. Linear Calibration Range Studies (EPA 180.1):
9. New Personnel:
10. Other (Such as ongoing comparison studies):

### v. IC:

1. Equipment Performance
2. Linear Range Calibration Study:
3. Hotblock Temperature Checks:
4. Pipettor Performance:
5. Balance Performance:
6. Annual QC Acceptance Limits Update (e.g. 365.1\_S):

## Environment Testing

7. Annual Reporting Limit Verification:
8. Annual MDL Studies (where applicable):
9. Linear Calibration Range Studies:
10. New Personnel:
11. Other:

### vi. Volatiles:

1. Equipment Performance
2. Balance Performance:
3. Annual QC Acceptance Limits Update:
4. Annual Reporting Limit Verification:
5. Annual MDL Studies (where applicable):
6. New Personnel:
7. Other (e.g. Quarterly GRO check):

### vii. Semi-Volatiles/Semi-Prep:

1. Equipment Performance
2. Balance Performance:
3. Annual QC Acceptance Limits Update:
4. Annual Reporting Limit Verification:
5. Annual MDL Studies (where applicable):
6. New Personnel:
7. Other:

### viii. Asbestos:

1. Microscope Performance
2. Balance Performance:
3. Microscope Alignment Calibration:
4. Monthly Air Contamination Checks:
5. New Personnel:
6. Other:

### ix. Microbiology:

1. Microscope Performance
2. Balance Performance:
3. Microscope Alignment Calibration:
4. Monthly Air Contamination Checks:
5. New Personnel:
6. Other:

### x. General Chemistry Manager

1. Equipment Performance
2. Balance Performance:
3. Annual QC Acceptance Limits Update:
4. Annual Reporting Limit Verification:
5. Annual MDL Studies (where applicable):
6. New Personnel:

7. Other:

xi. Filtration Manager

1. Equipment Performance
2. Balance Performance:
3. Annual QC Acceptance Limits Update:
4. Annual Reporting Limit Verification:
5. Annual MDL Studies (where applicable):
6. New Personnel:
7. Other:

xii. Volatile Air & Soil Manager

1. Equipment Performance
2. Balance Performance:
3. Annual QC Acceptance Limits Update:
4. Annual Reporting Limit Verification:
5. Annual MDL Studies (where applicable):
6. New Personnel:
7. Other:

b. Major PT Failure issues (QA)

- c. Repeat and total number of deficiencies per department (Each Dept. Supervisor provide info. on repeat and total number of deficiencies related to a specific analysts or your dept. and how it is being handled, technical reprimands, etc.)

Metals:

Metals Prep:

Wet Chemistry:

IC:

Volatiles:

Semi-Volatiles:

Semi-Prep:

Asbestos:

Microbiology:

General Chemistry:

Filtration:

Volatile Air & Soil (VAS):

Sample Receiving:

4. Managerial Reports

- a. Equipment Needs (Each Dept. Supervisor to provide info. on current equip./staff needs)

Metals:

Metals Prep:

Wet Chemistry:

IC:

Volatiles:



Semi-Volatiles:

Semi-Prep:

Asbestos:

Microbiology:

General Chemistry:

Filtration:

Volatile Air & Soil (VAS):

Sample Receiving:

## b. Equipment Maintenance

- i. Calibration Information (Laboratory Manager)
- ii. Repair and maintenance data (Laboratory Manager)
- iii. Equipment downtime logs/review (Each Dept. Supervisor)

Metals:

Metals Prep:

Wet Chemistry:

IC:

Volatiles:

Semi-Volatiles:

Semi-Prep:

Asbestos:

Microbiology:

General Chemistry:

Filtration:

Volatile Air & Soil (VAS):

Sample Receiving:

## iv. Resources

1. Staffing Needs (Each Dept. Supervisor/Laboratory Manager)
2. Department Training Needs (QA-Technical Director)
3. Facility and Equipment Needs (BUMa/Laboratory Manager)

## 5. Internal Auditing

- a. Audit Results (QA)
- b. Audit Schedule (QA)
- c. Nonconformance by Department (HR)
- d. Results of Inter-Laboratory comparisons or proficiency (QA)

## 6. Corrective Actions

- a. Type and source of issues (Each dept. Supervisor)

Metals:

Metals Prep:

Wet Chemistry:

IC:

Volatiles:

Semi-Volatiles:

Semi-Prep:

Asbestos:

Microbiology:

General Chemistry:

Filtration:

Volatile Air & Soil (VAS):

Sample Receiving:

- b. Areas most commonly having problems (QA)
  - c. Trends of root causes (QA)
  - d. Reoccurring problems (QA)
  - e. Summary and review of corrective action log (QA)
7. External Audit
- a. Performance Evaluation for Quality System and Technical Aspects (QA)
  - b. Evaluation common weak areas from each auditing agency (QA)
8. Quality Planning
- a. Upcoming projects (Customer Service Manager)
  - b. Status of ongoing projects (Customer Service Manager)
  - c. Significant changes including staff/equipment/required accreditations (BUMa)
9. Customer Feedback (Customer Service Manager)
- a. Customer complaints
    - i. Review of Customer Complaint Corrective Action Logs
      - 1. Repeated complaints
      - 2. Related/Unrelated issues
      - 3. Cause of issues identified and corrective measures followed
      - 4. Weekly meeting review
  - b. Client satisfaction survey
10. Improvements (BUMa/Laboratory Manager)
- a. Review of Quality Policy/Objectives
  - b. Review of Quality Systems effectiveness and improvement of system and services

Detail and assign responsible party time line for implementation of task.

EUROFINS ENVIRONMENT TESTING SOUTHEAST, LLC. Atlanta  
ANNUAL MANAGEMENT REVIEW

My signature confirms that I participated in the Annual Management Review:

Name

## Position

Date

UNCONTROLLED COPY

## **APPENDIX E**

### **Example Field Forms**



514 Hillcrest Industrial Boulevard  
Macon, Georgia 31204

**P** (478) 757-1606

**F** (478) 757-1608

**Terracon.com**

### DAILY ABATEMENT PROJECT REPORT

Project Name: \_\_\_\_\_ Date: \_\_\_\_\_

TERRACON Project Number: \_\_\_\_\_ Address: \_\_\_\_\_

#### WORKFORCE SIZE

| Contractor | Inside Containment | Outside Containment | Start | End | Hours |
|------------|--------------------|---------------------|-------|-----|-------|
|            |                    |                     |       |     |       |
|            |                    |                     |       |     |       |
|            |                    |                     |       |     |       |
|            |                    |                     |       |     |       |
|            |                    |                     |       |     |       |

#### VISITORS TO SITE

| Name | Company/Agency | In | Out | Comments |
|------|----------------|----|-----|----------|
|      | Terracon       |    |     |          |
|      | Terracon       |    |     |          |
|      |                |    |     |          |

#### WORK IN PROGRESS

|                           |                      |                    |
|---------------------------|----------------------|--------------------|
| ___ Work Area Preparation | ___ Surgical Removal | ___ Encapsulation  |
| ___ Mini-Containment      |                      |                    |
| ___ Waste Load Out        | ___ Cleaning         | ___ Final Cleaning |
| ___ Removal               | ___ Other: _____     | ___ Clearance      |



**DAILY ABATEMENT PROJECT REPORT**

Project Name: \_\_\_\_\_ Date: \_\_\_\_\_  
Terracon Project Number: \_\_\_\_\_ Location: \_\_\_\_\_

Project Manager: \_\_\_\_\_  
Signature: \_\_\_\_\_ Date: \_\_\_\_\_





Environment Testing

Eurofins Environment Testing Southeast-Atlanta, LLC

3080 Presidential Drive, Atlanta, GA 30340

Phone: (770) 457-8177 / Toll-Free: (800) 972-4889

[www.EurofinsUS.com](http://www.EurofinsUS.com)

Work Order: \_\_\_\_\_

Page \_\_\_\_ of \_\_\_\_

**CHAIN OF CUSTODY  
BULK ASBESTOS ANALYSIS**

|                         |                            |
|-------------------------|----------------------------|
| Client Name: _____      | Project Name: _____        |
| Address: _____          | Project Number: _____      |
| City, State, Zip: _____ | Sampling Date: _____       |
| Contact: _____          | Phone #: _____             |
| Sampler's Name: _____   | Invoice To Name(s): _____  |
| Report To: _____        | Invoice To Email(s): _____ |
| Report to Email: _____  | PO #: _____                |

|    | Sample ID | Sample Location/Description | Analysis Requested | Turnaround Time (TAT) | Comments |
|----|-----------|-----------------------------|--------------------|-----------------------|----------|
| 1  |           |                             |                    |                       |          |
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|                        |                  |
|------------------------|------------------|
| Relinquished by: _____ | Date/Time: _____ |
| Received by: _____     | Date/Time: _____ |
| Relinquished by: _____ | Date/Time: _____ |
| Received by: _____     | Date/Time: _____ |

Submission of samples to the laboratory constitutes acceptance of EETSE's Terms & Conditions. Client assumes sole responsibility for damage or loss of samples before we accept them. Samples received after 3PM or on Saturday are considered as received the following business day. If no TAT is marked on COC, EETSE-Atlanta will proceed with standard TAT.

Asbestos COC2.28.24

FOR LAB USE ONLY

Lab Recipient: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Method of Shipment: \_\_\_\_\_



Environment Testing

Eurofins Environment Testing Southeast-Atlanta, LLC  
3080 Presidential Drive, Atlanta, GA 30340  
Phone: (770) 457-8177 / Toll-Free: (800) 972-4889  
[www.EurofinsUS.com](http://www.EurofinsUS.com)

Work Order: \_\_\_\_\_

Page \_\_\_\_ of \_\_\_\_

**CHAIN OF CUSTODY  
BULK ASBESTOS ANALYSIS**

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| Client Name: _____      | Project Name: _____        |
| Address: _____          | Project Number: _____      |
| City, State, Zip: _____ | Sampling Date: _____       |
| Contact: _____          | Phone #: _____             |
| Sampler's Name: _____   | Invoice To Name(s): _____  |
| Report To: _____        | Invoice To Email(s): _____ |
| Report to Email: _____  | PO #: _____                |

|    | Sample ID | Sample Location/Description | Analysis Requested | Turnaround Time (TAT) | Comments |
|----|-----------|-----------------------------|--------------------|-----------------------|----------|
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Work Order: \_\_\_\_\_

Page \_\_\_\_ of \_\_\_\_

**CHAIN OF CUSTODY  
BULK ASBESTOS ANALYSIS**

|                         |                            |
|-------------------------|----------------------------|
| Client Name: _____      | Project Name: _____        |
| Address: _____          | Project Number: _____      |
| City, State, Zip: _____ | Sampling Date: _____       |
| Contact: _____          | Phone #: _____             |
| Sampler's Name: _____   | Invoice To Name(s): _____  |
| Report To: _____        | Invoice To Email(s): _____ |
| Report to Email: _____  | PO #: _____                |

|    | Sample ID | Sample Location/Description | Analysis Requested | Turnaround Time (TAT) | Comments |
|----|-----------|-----------------------------|--------------------|-----------------------|----------|
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Submission of samples to the laboratory constitutes acceptance of EETSE's Terms & Conditions. Client assumes sole responsibility for damage or loss of samples before we accept them. Samples received after 3PM or on Saturday are considered as received the following business day. If no TAT is marked on COC, EETSE-Atlanta will proceed with standard TAT.

Asbestos COC2.28.24

FOR LAB USE ONLY

Lab Recipient: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Method of Shipment: \_\_\_\_\_



CHAIN OF CUSTODY

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------|------|-----------------|-----------|-----------------------------------------------------------------------------------|--------------------------|---------------------------------------|--|--|--|--|--|--|--|--|--|--|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------|
| COMPANY:                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           | ADDRESS:   |      |                 |           |                                                                                   | ANALYSIS REQUESTED       |                                       |  |  |  |  |  |  |  |  |  |  | Visit our website<br><b>www.EurofinsUS.com</b> for<br>downloadable COCs. |                                                                                                                   | Number of Containers |
| PHONE:                                                                                                                                                                                                                                                                                                                                                                                                                                                          |           | EMAIL:     |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| SAMPLED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                     |           | SIGNATURE: |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| #                                                                                                                                                                                                                                                                                                                                                                                                                                                               | SAMPLE ID | SAMPLED:   |      | GRAB            | COMPOSITE | MATRIX<br>(see codes)                                                             | PRESERVATION (see codes) |                                       |  |  |  |  |  |  |  |  |  |  | REMARKS                                                                  |                                                                                                                   |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           | DATE       | TIME |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
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| 8                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 9                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 10                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 11                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 12                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 13                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 14                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| RELINQUISHED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                |           | DATE/TIME: |      | RECEIVED BY:    |           | DATE/TIME:                                                                        |                          | PROJECT INFORMATION                   |  |  |  |  |  |  |  |  |  |  |                                                                          | RECEIPT                                                                                                           |                      |
| 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      | 1.              |           |                                                                                   |                          | PROJECT NAME:                         |  |  |  |  |  |  |  |  |  |  |                                                                          | Total # of Containers                                                                                             |                      |
| 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      | 2.              |           |                                                                                   |                          | PROJECT #:                            |  |  |  |  |  |  |  |  |  |  |                                                                          | Turnaround Time (TAT) Request in Business Days                                                                    |                      |
| 3.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      | 3.              |           |                                                                                   |                          | SITE ADDRESS:                         |  |  |  |  |  |  |  |  |  |  |                                                                          | <input type="checkbox"/> Standard <input type="checkbox"/> 4-Day Rush*                                            |                      |
| SPECIAL INSTRUCTIONS/COMMENTS:                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |            |      | SHIPMENT METHOD |           | OUT: / / VIA:<br>IN: / / VIA:<br>Client FedEx UPS US mail courier<br>other: _____ |                          | SEND REPORT TO:                       |  |  |  |  |  |  |  |  |  |  |                                                                          | <input type="checkbox"/> 3-Day Rush* <input type="checkbox"/> 2-Day Rush*                                         |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                 |           |                                                                                   |                          | INVOICE TO (IF DIFFERENT FROM ABOVE): |  |  |  |  |  |  |  |  |  |  |                                                                          | <input type="checkbox"/> Next Day Rush* <input type="checkbox"/> Other _____                                      |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                 |           |                                                                                   |                          | QUOTE #:                              |  |  |  |  |  |  |  |  |  |  |                                                                          | <input type="checkbox"/> Same-Day Rush* (auth req.)                                                               |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                 |           |                                                                                   |                          | PO#:                                  |  |  |  |  |  |  |  |  |  |  |                                                                          | * Surcharges apply for Rush TAT                                                                                   |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                 |           |                                                                                   |                          | REGULATORY PROGRAM (if any):          |  |  |  |  |  |  |  |  |  |  |                                                                          | DATA PACKAGE: I <input type="radio"/> II <input type="radio"/> III <input type="radio"/> IV <input type="radio"/> |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| Submission of samples to the laboratory constitutes acceptance of EETSE's Terms & Conditions. Client assumes sole responsibility for damage or loss of samples before we accept them. Samples received after 3PM or on Saturday are considered as received the following business day. If no TAT is marked on COC, EETSE-Atlanta will proceed with standard TAT. Samples are disposed of 30 days after completion of report unless other arrangements are made. |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |

## CHAIN OF CUSTODY

| COMPANY:                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           |            |      | ADDRESS:        |           |                                                                                       |                          | ANALYSIS REQUESTED                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         | Visit our website<br>www.EurofinsUS.com for<br>downloadable COCs.                                                                                                                                                                  |  |  |  | Number of Containers |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------|------|-----------------|-----------|---------------------------------------------------------------------------------------|--------------------------|---------------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|----------------------|--|
| PHONE:                                                                                                                                                                                                                                                                                                                                                                                                                                                          |           |            |      | EMAIL:          |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| SAMPLED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                     |           |            |      | SIGNATURE:      |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| #                                                                                                                                                                                                                                                                                                                                                                                                                                                               | SAMPLE ID | SAMPLED:   |      | GRAB            | COMPOSITE | MATRIX<br>(see codes)                                                                 | PRESERVATION (see codes) |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  | REMARKS |                                                                                                                                                                                                                                    |  |  |  |                      |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           | DATE       | TIME |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| 8                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| 9                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| 10                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| 11                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| 12                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| 13                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| 14                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| RELINQUISHED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                |           | DATE/TIME: |      | RECEIVED BY:    |           | DATE/TIME:                                                                            |                          | PROJECT INFORMATION                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         | RECEIPT                                                                                                                                                                                                                            |  |  |  |                      |  |
| 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      | 1.              |           |                                                                                       |                          | PROJECT NAME:                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         | Total # of Containers                                                                                                                                                                                                              |  |  |  |                      |  |
| 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      | 2.              |           |                                                                                       |                          | PROJECT #:                            |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         | Turnaround Time (TAT) Request in Business Days                                                                                                                                                                                     |  |  |  |                      |  |
| 3.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      | 3.              |           |                                                                                       |                          | SITE ADDRESS:                         |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         | <input type="checkbox"/> Standard <input type="checkbox"/> 4-Day Rush*<br><input type="checkbox"/> 3-Day Rush* <input type="checkbox"/> 2-Day Rush*<br><input type="checkbox"/> Next Day Rush* <input type="checkbox"/> Other ____ |  |  |  |                      |  |
| SPECIAL INSTRUCTIONS/COMMENTS:                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |            |      | SHIPMENT METHOD |           | OUT: / / VIA:<br>IN: / / VIA:<br>Client FedEx UPS US mail courier<br><br>other: _____ |                          | SEND REPORT TO:                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         | <input type="checkbox"/> Same-Day Rush* ( <b>auth req.</b> )                                                                                                                                                                       |  |  |  |                      |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                 |           |                                                                                       |                          | INVOICE TO (IF DIFFERENT FROM ABOVE): |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         | * Surcharges apply for Rush TAT                                                                                                                                                                                                    |  |  |  |                      |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                 |           |                                                                                       |                          | QUOTE #:_____ PO#:_____               |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         | REGULATORY PROGRAM (if any):                                                                                                                                                                                                       |  |  |  |                      |  |
| DATA PACKAGE: I <input type="radio"/> II <input type="radio"/> III <input type="radio"/> IV <input checked="" type="radio"/>                                                                                                                                                                                                                                                                                                                                    |           |            |      |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |
| Submission of samples to the laboratory constitutes acceptance of EETSE's Terms & Conditions. Client assumes sole responsibility for damage or loss of samples before we accept them. Samples received after 3PM or on Saturday are considered as received the following business day. If no TAT is marked on COC, EETSE-Atlanta will proceed with standard TAT. Samples are disposed of 30 days after completion of report unless other arrangements are made. |           |            |      |                 |           |                                                                                       |                          |                                       |  |  |  |  |  |  |  |  |  |  |  |  |  |  |         |                                                                                                                                                                                                                                    |  |  |  |                      |  |

## CHAIN OF CUSTODY

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------|------|--------------------|-----------|-----------------------|--------------------------|---------------------------------------|--|--|--|--|--|--|--|-------------------------------------------------------------------|--|----------------------|---------|-------------------------------------------------------------------------------------------------------------------|--|
| COMPANY:                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           | ADDRESS:   |      | ANALYSIS REQUESTED |           |                       |                          |                                       |  |  |  |  |  |  |  | Visit our website<br>www.EurofinsUS.com for<br>downloadable COCs. |  | Number of Containers |         |                                                                                                                   |  |
| PHONE:                                                                                                                                                                                                                                                                                                                                                                                                                                                          |           | EMAIL:     |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
| SAMPLED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                     |           | SIGNATURE: |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
| #                                                                                                                                                                                                                                                                                                                                                                                                                                                               | SAMPLE ID | SAMPLED:   |      | GRAB               | COMPOSITE | MATRIX<br>(see codes) |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           | DATE       | TIME |                    |           |                       | PRESERVATION (see codes) |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      | REMARKS |                                                                                                                   |  |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
| 8                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
| 9                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
| 10                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
| 11                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
| 12                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
| 13                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
| 14                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |
| RELINQUISHED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                |           | DATE/TIME: |      | RECEIVED BY:       |           | DATE/TIME:            |                          | PROJECT INFORMATION                   |  |  |  |  |  |  |  |                                                                   |  |                      |         | RECEIPT                                                                                                           |  |
| 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      | 1.                 |           |                       |                          | PROJECT NAME:                         |  |  |  |  |  |  |  |                                                                   |  |                      |         | Total # of Containers                                                                                             |  |
| 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      | 2.                 |           |                       |                          | PROJECT #:                            |  |  |  |  |  |  |  |                                                                   |  |                      |         | Turnaround Time (TAT) Request in Business Days                                                                    |  |
| 3.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      | 3.                 |           |                       |                          | SITE ADDRESS:                         |  |  |  |  |  |  |  |                                                                   |  |                      |         | <input type="checkbox"/> Standard <input type="checkbox"/> 4-Day Rush*                                            |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                    |           |                       |                          | SEND REPORT TO:                       |  |  |  |  |  |  |  |                                                                   |  |                      |         | <input type="checkbox"/> 3-Day Rush* <input type="checkbox"/> 2-Day Rush*                                         |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                    |           |                       |                          | INVOICE TO (IF DIFFERENT FROM ABOVE): |  |  |  |  |  |  |  |                                                                   |  |                      |         | <input type="checkbox"/> Next Day Rush* <input type="checkbox"/> Other ____                                       |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         | <input type="checkbox"/> Same-Day Rush* (auth req.)                                                               |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         | * Surcharges apply for Rush TAT                                                                                   |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         | REGULATORY PROGRAM (if any):                                                                                      |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         | DATA PACKAGE: I <input type="radio"/> II <input type="radio"/> III <input type="radio"/> IV <input type="radio"/> |  |
| Submission of samples to the laboratory constitutes acceptance of EETSE's Terms & Conditions. Client assumes sole responsibility for damage or loss of samples before we accept them. Samples received after 3PM or on Saturday are considered as received the following business day. If no TAT is marked on COC, EETSE-Atlanta will proceed with standard TAT. Samples are disposed of 30 days after completion of report unless other arrangements are made. |           |            |      |                    |           |                       |                          |                                       |  |  |  |  |  |  |  |                                                                   |  |                      |         |                                                                                                                   |  |



## **APPENDIX C**

# **Terracon Corporate Quality Program Manual**



# Terracon

## Quality Program Manual

*Our Commitment to Quality Starts Here*

Environmental



Facilities



Geotechnical



Materials



# Terracon

## Quality Program Manual

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### CONTENTS

---

#### LETTER FROM THE CEO

3

---

#### INTRODUCTION

4

---

#### VISUAL OVERVIEW

5

---

#### QUALITY AT THE COMPANY LEVEL

6

---

#### QUALITY AT THE PROJECT LEVEL

9

---

#### ABOUT TERRACON

12

---

### WELCOME TO TERRACON

Terracon provides environmental, facilities, geotechnical, and materials consulting engineering services delivered with responsiveness, resourcefulness, and reliability.

With offices across the nation, Terracon has the right teams of equipped, skilled, and trained personnel who are ready to perform outstanding work on your next project. We proudly service tens of thousands of projects every year.

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Rev 07.29.2021



## LETTER FROM THE CEO

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Terracon is committed to assigning qualified staff and providing quality services to our clients on every project. This is a key component of our mission to deliver success to employees, clients, and communities.

Our commitment to quality is demonstrated by our shared dedication, passion, and focus on our Quality Program. It extends to every member of our company, who work each day to provide professional services that:

- Provide accurate data, observations, tests, and measurements.
- Demonstrate alignment with professional practices, industry standards, and recognized guidance.
- Support transparency and open communication with our clients.
- Adhere to the business needs and contractual requirements of our clients.

To support our mission, Terracon has long maintained our Quality Program, with the most current iteration described in this Quality Program Manual. Driven by a continuous improvement philosophy that involves our employees, subcontractors, and vendors, we apply the program at both the company and project levels and regularly review and refine it over time.

Quality service is achieved through the combined effort of many dedicated people at all levels, carrying out their roles at the company level and directly on your project. Our services are performed by qualified staff, supervised by experienced managers, and supported by professionals with skills and knowledge unique to each service. The ability to conduct our tasks safely is also ingrained into every aspect of our quality process. Terracon will not provide services that we are not adequately experienced to perform safely or if we believe that we would be unable to provide an appropriate level of service.

By focusing on our areas of expertise, Terracon sustains the successful, quality results you expect for your projects.



A handwritten signature in black ink, reading "M. Gayle Packer".

M. Gayle Packer  
President and CEO  
Terracon Consultants, Inc.



## INTRODUCTION

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Our Quality Program sets out the processes we use to systematically develop a work product that provides accurate, repeatable, and consistent information and opinions. We take great pride in maintaining and continuously improving a responsive Quality Program that actively delivers on our commitment to quality. The program, long-established, has been evaluated, regularly monitored, revised, and managed through company-wide leadership efforts that begin at the executive level. Implementation continues at the operational level through management leadership and through specific leadership positions that focus on the needs and challenges of the services that we perform.

The Quality Program is executed at the project level through the collaborative relationships of multiple team members, including those with direct project responsibility, project oversight, and additional senior subject matter experts. Through this process, data, calculations, opinions, recommendations, and

conclusions are checked and vetted before issuing to our clients. Projects are performed by qualified staff with quality oversight and review throughout the life of the project by company-approved experienced staff. When needed, experts with specialized knowledge are assigned to provide their expertise.

You might be asking, “What does this mean for me or my organization?” Our commitment to quality means that before every project starts, Terracon has already established specific operational approaches, procedures, and practices that enable us to deliver quality service directly to you at every stage of your journey to project completion.

To demonstrate our Quality Program in action, the following visual personas on the next page are used to detail our commitment to you through the voices of our committed managers, professional staff, and team members as they work together to deliver consistent quality.



# OUR QUALITY PROGRAM: VISUAL OVERVIEW

## EXECUTIVE AND SENIOR MANAGEMENT



Executive Committee



Quality and Project Delivery Leadership Team



Chief Development Officer

## SERVICE LINE AND OPERATIONAL MANAGEMENT

- Environmental
- Facilities
- Geotechnical
- Materials



Service Line Leaders



Operating Group and Division Managers



Office and Department Managers



APR Review Committee



QUALITY PROGRAM...

...at the **COMPANY** level

QUALITY PROGRAM...

...at the **PROJECT** level



## PROJECT MANAGEMENT, QUALITY CONTROL AND ASSURANCE



Authorized Project Reviewers



Project Managers



Project Executives (Type II Projects)



Subject Matter Experts



Data-Only Reviewers

## PROJECT TASKS AND DAILY OPERATIONS



Professional Standards



Communication



Quality Control



Field and Lab Data



Administration



## OUR QUALITY PROGRAM: AT THE COMPANY LEVEL

In addition to the leadership provided by our CEO, Terracon empowers a cross-functional matrix of company roles with specific responsibilities to lead aspects of our Quality Program. This collaborative structure includes both the operational chain of command as well as leadership in each service.

Our services are categorized into four service lines: environmental, facilities, geotechnical, and materials. This service line structure provides specific quality leadership and processes to address the unique challenges within each service line. Quality process oversight for each service line includes the selection, vetting, approval, and ongoing evaluation of qualified project reviewers within each operational division. We also regularly evaluate program components at the company and office levels through committees with additional quality responsibilities. Each committee is staffed by both executive-level managers and service line leaders. This arrangement balances operational perspectives with specific service line considerations.

Overall project quality within each service line is regularly evaluated through project reviews. The scope of these reviews includes representative samples of project work associated with each individual project reviewer, who is also assessed on their effectiveness as a reviewer.

Our Quality Program is also calibrated based on the results of client feedback assessments and our annual survey of project managers and authorized project reviewers.

Through individual and group effort, our Quality Program undergoes a recurring process of evaluation, improvement, and review. Acting as individuals and in collaborative teams, each role and committee helps us achieve quality and deliver superior service to our clients.

The following entities carry out our Quality Program at the company level:

### EXECUTIVE COMMITTEE

The Executive Committee meets regularly to discuss issues and to set policies regarding our operations. This committee is composed of the CEO, our most senior operational executives, and other key senior managers. Top priorities include client service, project delivery, and the measurement and achievement of quality objectives.



***“As a member of the Executive Committee and a senior leader representing our company, I am committed to the implementation, measurement, and continuous improvement of our quality objectives and a level of service and delivery that provides a fulfilling experience for our clients and lasting relationships.”***

## QUALITY AND PROJECT DELIVERY LEADERSHIP TEAM

Terracon established this leadership team to oversee our Quality Program. The team consists of executive, operational, and service line leadership and meets regularly to examine current quality and project delivery practices and develop improvements and enhancements in our managing, executing, and delivering quality projects. The team provides oversight of the service lines on quality issues and is tasked with the design and implementation of operational quality improvements. The team also promotes project management as a core competency within the company and defines the Quality Program responsibilities of project managers.



*"Quality is more than meeting a standard. Quality is about my commitment and that of our employee-owners and organization to deliver services and solutions that exceed the expectations of the client in terms of contractual compliance, technical accuracy, effective communication, and results delivered. As a QPDLT member, I have an opportunity to help shape and craft the culture of quality in Terracon through input from our employee-owners, clients, and external stakeholders."*

## CHIEF DEVELOPMENT OFFICER

The senior executive in this position is devoted solely to maintaining and improving the quality and delivery of our services. In concert with the Quality and Project Delivery Leadership Team, the Chief Development Officer is charged with monitoring the quality of our services and is responsible for developing the quality



program and the project quality review process. This pivotal role works with all other roles in the Quality Program to assess the quality of service delivered to our clients, to examine current operations, and to determine areas of improvement.

*"As Chief Development Officer, I am committed to overseeing the implementation of our quality processes in Terracon. I will utilize interactions, reviews, surveys, assessments and feedback to identify and address areas needing improvement. In the spirit of continuous improvement, I will implement the necessary changes to continue to grow and improve our Quality Program."*

## SERVICE LINE LEADERS

Senior technical professionals in service line leadership roles are appointed to lead development, promote innovation, drive growth, and oversee the policies, practices, and activities, including quality, of one of our four major service lines:

- Environmental
- Facilities
- Geotechnical
- Materials

Service line leadership includes service line directors and their assistant directors as well as operational representatives within each division.



*"As a service line leader, I embrace the responsibility to render quality in all aspects of our exploration, testing and consulting work. In order to deliver the value that our clients deserve, we make quality a priority, and we institute a continuous improvement process that constantly evaluates and improves our systems, processes and procedures."*

## OPERATING GROUP AND DIVISION MANAGEMENT

Our operations are organized nationally into groups geographically (east, central, and west) by office location, and each operating group is subdivided into divisions. Responsible for promoting and enforcing the Quality Program at the operational



levels, our operating group and division managers lead and support the implementation of the program within their assigned geographic area.

*"As a Terracon division manager, I see quality as the value that drives our everyday actions that deliver responsible, resourceful and reliable results to our clients. I am committed to ensuring Terracon employees are well trained, equipped and motivated to produce quality work that leads to successful completion of our client's projects."*



## OFFICE AND DEPARTMENT MANAGEMENT

Offices are led overall by office managers and applicable service lines within an office are grouped as departments within the office and led by department managers who report to the office manager. Office and department managers implement and oversee the Quality Program within their office and department.



## APR REVIEW COMMITTEE

Each service line has an APR Review Committee, made up of representatives from each division charged with service line quality leadership within their respective divisions. Members of this committee are responsible for mentoring a select subset of staff with unique talents and a history of demonstrated project and quality success who have the competence to take on project oversight and review responsibilities to become authorized project reviewers (APRs). Because APRs are charged with project quality oversight duties, their role is essential to our business.

The APR Review Committee prepares each APR candidate to take on their project oversight responsibilities. APR Review Committee members perform APR performance evaluations and assist division and office managers in APR training.

*"As a member of the APR Review Committee, I am committed to focus on the training, development and oversight of new and existing APRs so that they fully understand the importance of their quality role at the project level. I coordinate with both service line and operations leadership so that both elements of our business are focused seamlessly at project level in how the APR executes their quality efforts."*



## OTHER CONTRACTUALLY REQUIRED QUALITY PROGRAM PROJECTS

In addition to our Type I and II projects (explained on the next page), we are sometimes asked to comply with other Quality Program requirements as set out in our project contracts, often based on project-specific needs or regulatory compliance factors. While the processes already contained in our program will generally meet those requirements, we are also able to adapt our approach to meet any additional project staffing or process needs.

One common example involves work performed at nuclear facilities. These projects often require compliance with the American Society of Mechanical Engineers (ASME) Quality Assurance Requirements for Nuclear Energy Facilities, commonly referred to as NQA-1. When an NQA-1 Quality Program is required by contract, the Chief Development Officer assigns a project quality assurance manager for the project as required by NQA-1 to oversee the project and the APR. In addition, the project will be subject to specific levels of required quality assurance that include audits of project activities and testing laboratories scheduled on at least an annual basis. These additional requirements are performed on top of the already robust requirements of the Terracon Quality Program. NQA-1 is one example of our ability to seamlessly incorporate specific contractually-required project requirements into our Quality Program to meet the quality needs of our clients.



# Terracon

## WE WELCOME YOUR FEEDBACK

*Although we strive for your complete satisfaction, we recognize a quality program is an ongoing pursuit and not a final destination. We value hearing from our clients directly. If you have a quality program question, improvement idea, or suggestion for us, please let us know by calling one of our offices or our Chief Development Officer.*

**See back cover for details.**



## OUR QUALITY PROGRAM: AT THE PROJECT LEVEL

With tens of thousands of projects each year in all sizes, large and small, Terracon provides a wide variety of services to our clients. Our services range from observation, inspection, and data acquisition to complex design, testing, technical, and engineering efforts. A variety of processes, roles, and responsibilities is available to provide the level of service and quality required by each project.

We group projects into two types. Larger, more complex projects that require additional project and/or management activity, attention, or oversight are classified as Type II projects. All other projects are classified as Type I projects.

Projects are staffed by qualified project personnel performing the various required tasks. Each person has an individual responsibility to understand the essential goals of the project and the needs of the client. Through training, evaluation, and external certifications and licensing as appropriate, our staff demonstrate that they are qualified and adequately experienced to perform their tasks in a manner that is consistent with applicable, standards, regulations, policies, and procedures. Individuals are also responsible for ongoing participation in appropriate technical training and continuing education to maintain their proficiency, certification, or licensing based on their role.

In addition to individual responsibilities, collaborative project review is a crucial component of our program. The level and extent of review depends on the deliverable or task. Field and laboratory data, calculations, and opinions, recommendations, and conclusions are reviewed by a second set of eyes for quality control. Laboratory processes are also subject to internal quality systems, codified in Terracon's Laboratory Quality Management System, to ensure accuracy of lab data.

To carry out these duties and achieve quality objectives, project managers and APRs work together, most importantly at project critical junctures. This collaboration brings the necessary project management and technical expertise to bear on each project. Depending on their size and complexity, some projects may be subject to additional oversight and expert review. Instead of relying solely on post-review discoveries in a reactive mode, the project manager and APR collaborate throughout the project to make proactive decisions together.

Program execution is confirmed through the signatures of both the project manager and APR on project deliverables.

The following section summarizes the assigned responsibilities of each major role in our Quality Program at the project level.





## AUTHORIZED PROJECT REVIEWER

Without exception, every project is assigned an authorized project reviewer (APR) who collaborates with the project manager on quality and technical objectives for the duration of the project. The APR is engaged at the proposal stage and remains on the project through execution and closeout.

APRs review proposals, procedures, calculations, and final submittals to verify data quality, accuracy, analytical methods, results, opinions, recommendations, and conclusions. On data-only projects, they perform important quality assurance functions by confirming that data review quality control responsibilities have been met for all deliverables.

The APR plays a central role in our Quality Program, highlighted by the following four primary areas of project responsibility:

- **Quality Oversight:** The APR reviews the proposal and is involved at the kick-off meeting and at major milestones, stages, and critical juncture providing guidance and insight to support the project to its successful completion.
- **Coaching:** The APR coaches or advises the project manager on various aspects of the project with an emphasis on quality, risk, on-time delivery, budget, scope of work, and other client expectations.
- **Risk Management:** The APR guides the project team to properly assess risk so that the project appropriately takes risk into account.
- **Safety Awareness:** The APR raises awareness at the project level by raising awareness and by communicating with the team to focus their attention on their own personal safety and on the safety of their co-workers.

If the technical aspects of a project exceed their experience or knowledge, the APR supplements the project team through the addition of subject matter experts to bring the additional necessary expertise. The APR also plays a key role by identifying potential Type II projects to appropriate service line representatives and operational management.

Selected based on their experience, technical knowledge, project management experience, and analytical and evaluation skills, APR candidates undergo a rigorous training and review process before being approved as an APR. APRs are also required to participate in annual training and in a periodic review process.

Ongoing Quality Program evaluation is also a role of the APR. Terracon conducts an annual survey of project managers and APRs with focused questions designed to obtain their feedback about the Quality Program and its execution. The results are used to confirm successful strategies and to identify areas for improvement.

*"As an authorized project reviewer for Terracon, I have a commitment to ensure that we achieve quality in our project deliverables meeting the needs and expectations of our clients and that the delivery of the project is in accordance with the project schedule and within budget. Typically, as the senior member of a team that delivers every project, I am also responsible for ensuring that our work is done in a safe manner and that risk is managed for the client as well as the company. Each project is an opportunity for me to coach and mentor staff in the technical and project management aspects of the work that we do to meet these overall objectives now and in the future."*



---

## PROJECT MANAGER

Each project is assigned to a capable project manager with the necessary skills to manage and effectively deliver the project to our clients. Project managers are accountable for the overall quality of their projects. As such, project managers are responsible for assigning qualified staff to perform the tasks associated with the project and for collaborating with APRs throughout the various phases of the project with particular emphasis at the project's critical junctures.



*"As a Project Manager for Terracon, Quality is my focus during all stages of a project, from clearly understanding my client's objectives to confirming their comprehension of the deliverable. I view Quality as my obligation to my clients, and as an opportunity to become their trusted advisor."*

While the project manager and APR are responsible for executing the project consistent with the Quality Program, we recognize the need for the following three (3) additional supporting project staff roles:

---

## PROJECT EXECUTIVE

Assigned to Type II projects, the project executive maintains the responsibility of executive-level oversight and successful delivery and monitoring of those projects to ensure that they are managed, executed, and delivered appropriately, particularly as it relates to the execution of our Quality Program. On a Type II project with unique technical challenges, the project executive oversees the selection of SMEs by the APR and confirms that the technical contributions of SMEs are appropriate. This role also covers more refined project execution and delivery matters such as client relationships, risk management, budget and schedule targets, staffing decisions, and overall project success.



*"My commitment to my responsibilities as a Project Executive is critical to the success of what is often a major high-risk project. The success of a project can be measured in many different ways. My experience and subsequent engagement provides the oversight necessary to support project quality expectations as well as to ensure that business needs, concerns, opportunities, and benefits are successfully met."*

---

## SUBJECT MATTER EXPERTS

A subject matter expert (SME) is a professional with specialized knowledge and experience within a specific industry or practice area. SMEs are assigned to projects by the APR when project tasks or work details are outside the expertise of the APR or when a SME is required by policy. SMEs guide the technical performance of those aspects of a project within their specified area of expertise.



*"As a Terracon subject matter expert (SME) I provide specialized expertise to my project teams and customers. My role requires specialized training, certification, industry leadership, and experience. The role isn't easy, but I find that the value our customers receive and strength our project teams gain is well worth the effort."*

---

## DATA-ONLY REVIEWER

A data-only reviewer (DOR) is an approved reviewer of laboratory and field observations and data collected on projects that are within our Materials and Facilities service lines with deliverables that do not include opinions, recommendations, or conclusions. The DOR conducts an independent review of field and laboratory observations, data, and calculations related to data collection. The DOR also confirms that data collection, calculations, and reporting conforms with project specifications and standards as well as Terracon internal quality standards.



*"I take my role as a Data-Only Reviewer seriously. It is my job to validate the integrity of the test data that my lab and field staff record. I am the first line of review to ensure that our project managers and engineers are given accurate data to provide valid assessments and recommendations."*





- ENVIRONMENTAL
- FACILITIES
- GEOTECHNICAL
- MATERIALS

## Quality Program Manual

*Our Commitment to  
Quality Starts Here*

### **ABOUT TERRACON**

*Terracon is a 100 percent employee-owned engineering consulting firm that has provided quality engineering services to clients since 1965. We are a multidisciplinary firm specializing in environmental, facilities, geotechnical, and materials services for private and public sector clients.*

*The firm has consistently achieved growth above the industry average. This is evidenced by an ongoing presence among the top 50 in the Engineering News-Record annual listing of the Top 500 Design Firms. Today, Terracon has more than 5,000 employees and more than 150 offices with services available in all 50 states.*

*Terracon's growth and development can be attributed to an emphasis by employees to be responsive to clients, a commitment to providing quality services, the ability to astutely take advantage of new opportunities and technologies, and an uncompromising commitment to a culture of ensuring every employee goes home safe every day.*

To learn more, call (800) 593-7777  
or visit us online at **www.terracon.com**

We also invite you to discover  
Terracon through our **newsletter** and  
connect with us on **social media**:

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Linked 

 Find us on:  
facebook.

You 



To find a local office,  
scan this code on your mobile device.

## **APPENDIX D**

### **Analytical Laboratory Documents**

*Standard Operating Procedure for the*  
**Quality Assurance Manual**

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3/27/2024

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## STANDARD OPERATING PROCEDURES FOR THE QUALITY ASSURANCE PROGRAM

### 2.0 TABLE OF CONTENTS

|                                                                | Page |
|----------------------------------------------------------------|------|
| 1.0 TITLE PAGE -----                                           | 1    |
| 2.0 TABLE OF CONTENTS -----                                    | 2    |
| 3.0 STATEMENT OF POLICY -----                                  | 7    |
| 3.1 Quality Policy -----                                       | 7    |
| 3.2 Purpose -----                                              | 7    |
| 3.3 Definitions -----                                          | 8    |
| 3.3.1 Quality Assurance -----                                  | 8    |
| 3.3.2 Quality Control -----                                    | 8    |
| 3.4 Fields of Testing -----                                    | 8    |
| 3.5 Management of the Quality Assurance Program -----          | 8    |
| 3.5.1 Manual Review -----                                      | 8    |
| 3.5.2 Policies or Procedures Needing Immediate Attention ----- | 8    |
| 3.6 Control of the Quality Assurance Manual -----              | 8    |
| 3.7 Order of Precedence -----                                  | 9    |
| 4.0 ORGANIZATION AND RESPONSIBILITY -----                      | 9    |
| 4.1 Organization -----                                         | 9    |
| 4.2 Organizational Structure -----                             | 9    |
| 4.2.1 Personnel Participation -----                            | 9    |
| 4.2.2 Organizational Understanding -----                       | 9    |
| 4.3 Organizational Chart -----                                 | 9    |
| 4.4 Responsibilities and Position Requirements -----           | 12   |
| 4.4.1 Business Unit Manager -----                              | 12   |
| 4.4.2 Laboratory Manager -----                                 | 12   |
| 4.4.3 Quality Assurance Manager Positions -----                | 13   |
| 4.4.3.1 Acting Quality Assurance Manager -----                 | 13   |
| 4.4.3.2 Deputy Quality Assurance Manager -----                 | 14   |
| 4.4.4 Department Director -----                                | 14   |
| 4.4.5 Technical Director -----                                 | 15   |
| 4.4.6 Microbiology Lab Supervisor -----                        | 16   |
| 4.4.7 Microbiology Analyst -----                               | 17   |
| 4.4.8 Technical Assistant -----                                | 17   |
| 4.4.9 Director of Project Management -----                     | 17   |
| 4.4.10 Project Manager -----                                   | 18   |
| 4.4.11 Department Manager -----                                | 18   |
| 4.4.12 Supervisors -----                                       | 20   |
| 4.4.13 Analysts -----                                          | 20   |
| 4.4.14 Project Manager Assistant -----                         | 21   |



## TABLE OF CONTENTS (cont.)

|                                                                           | Page |
|---------------------------------------------------------------------------|------|
| 4.5 Improper Actions, Data Integrity System, Client Confidentiality ----- | 21   |
| 4.6 Undue Internal and External Pressures -----                           | 24   |
| 4.7 Responsibility for QA Program Adherence -----                         | 25   |
| 5.0 QUALITY ASSURANCE PROGRAM -----                                       | 25   |
| 5.1 Purpose of QA Program -----                                           | 25   |
| 5.2 Revisions to QA Program -----                                         | 25   |
| 5.3 Definitions -----                                                     | 26   |
| 5.3.26 Estimation of Uncertainty -----                                    | 30   |
| 5.4 Data Quality Objectives -----                                         | 31   |
| 5.5 Criteria for Quality Indicators -----                                 | 31   |
| 5.6 External Quality Assurance Objectives -----                           | 33   |
| 5.7 Internal Quality Control -----                                        | 35   |
| 5.8 Procedures for Assessing Out-Of-Control Situations -----              | 49   |
| 5.8.5 Risks and Opportunities -----                                       | 49   |
| 5.8.6 Improvement -----                                                   | 50   |
| 5.9 Inter-laboratory QA and QC -----                                      | 52   |
| 5.10 Sample Dilution -----                                                | 52   |
| 6.0 SAMPLE BOTTLE PREPARATION -----                                       | 62   |
| 6.1 Sampling Services -----                                               | 62   |
| 6.2 Sample Container Preparation -----                                    | 62   |
| 6.3 Indicating Preservation on Containers -----                           | 62   |
| 6.4 Indicating Preservative Lot # on Containers -----                     | 62   |
| 6.5 Packing of Bottles -----                                              | 62   |
| 6.6 Sterile Bottles -----                                                 | 62   |
| 6.7 Preservatives and Removal of Interferences -----                      | 63   |
| 6.8 Bottle Kit Preparation -----                                          | 63   |
| 7.0 CUSTODY OF SAMPLES, EQUIPMENT AND SUPPLIES -----                      | 63   |
| 7.1 Review of New Work -----                                              | 63   |
| 7.2 Sample Receipt -----                                                  | 65   |
| 7.3 Review of Sample Login -----                                          | 68   |
| 7.4 Sample Receipt Non-Conformance -----                                  | 69   |
| 7.5 Health and Safety -----                                               | 69   |
| 7.6 Sample Custody -----                                                  | 70   |
| 7.7 Continuous Chains of Custody -----                                    | 71   |
| 7.8 Data Security -----                                                   | 73   |
| 7.9 Container Receipt -----                                               | 74   |
| 7.10 Subcontracting to Other Laboratories -----                           | 75   |
| 7.11 Purchasing Services and Supplies -----                               | 75   |
| 8.0 ANALYTICAL PROCEDURES -----                                           | 76   |
| 8.1 Method Sources -----                                                  | 76   |
| 8.2 Document Control -----                                                | 76   |
| 8.3 Instructions and Procedures -----                                     | 77   |

## TABLE OF CONTENTS (cont.)

|                                                                                                             | Page |
|-------------------------------------------------------------------------------------------------------------|------|
| 8.4 Electronic Document Control-----                                                                        | 78   |
| 8.5 Creating and Maintaining Standard Operating Procedures-----                                             | 78   |
| 8.6 Responsibilities -----                                                                                  | 79   |
| 8.7 Definitions -----                                                                                       | 79   |
| 8.8 New Procedure Initiation -----                                                                          | 80   |
| 8.9 Standard Operating Procedure Formatting-----                                                            | 80   |
| 8.10 Table of Contents-----                                                                                 | 81   |
| 8.11 SOP Body – Non-Technical (Administrative) -----                                                        | 84   |
| 8.12 Procedure Review and Revision-----                                                                     | 84   |
| 8.13 Technical Review-----                                                                                  | 84   |
| 8.14 Procedure Changes -----                                                                                | 85   |
| 8.15 Standard Operating Procedures Document Control -----                                                   | 85   |
| 8.16 SOP Uncontrolled Documents-----                                                                        | 85   |
| 8.17 Procedure Archive-----                                                                                 | 86   |
| 8.18 Temporary Change -----                                                                                 | 86   |
| 9.0 CALIBRATION PROCEDURES AND FREQUENCY-----                                                               | 89   |
| 9.1 Identification and Control of Materials, Parts and Components-----                                      | 89   |
| 9.1.1.1 AIHA LAP Traceability of Measurement Policy-----                                                    | 89   |
| 9.2 Instrumentation List-----                                                                               | 93   |
| 9.3 Measurement Traceability and Calibration-----                                                           | 93   |
| 10.0 PREVENTATIVE MAINTENANCE -----                                                                         | 95   |
| 10.1 Instrument Maintenance -----                                                                           | 95   |
| 10.2 Preventive Maintenance -----                                                                           | 96   |
| 10.3 Glassware Cleaning -----                                                                               | 96   |
| 10.4 Contamination Control -----                                                                            | 97   |
| 11.0 QUALITY CONTROL CHECKS AND ROUTINES TO ASSESS<br>PRECISION, ACCURACY AND METHOD DETECTION LIMITS ----- | 98   |
| 11.1 Control of Special Processes-----                                                                      | 98   |
| 11.2 Quality Control in the Laboratory-----                                                                 | 98   |
| 11.3 Inter-laboratory Quality Control -----                                                                 | 102  |
| 11.4 Out-Of-Control Conditions in Laboratory Control Samples -----                                          | 102  |
| 11.5 Identification of Analytes -----                                                                       | 102  |
| 11.6 Quantitation and Reporting of Analytes-----                                                            | 103  |
| 11.7 Reporting Data-----                                                                                    | 103  |
| 11.8 Storage of Quality Related Data-----                                                                   | 104  |
| 11.9 Internal Performance Audits -----                                                                      | 104  |
| 11.10 Failure of Quality Control Indicators -----                                                           | 105  |
| 12.0 DATA REDUCTION, REVIEW AND REPORTING -----                                                             | 105  |
| 12.1 Introduction-----                                                                                      | 105  |
| 12.2 Sample Analysis and Data Reduction -----                                                               | 105  |
| 12.3 Data Transfer and Review-----                                                                          | 105  |
| 12.4 Special Project or Data Package Review-----                                                            | 107  |
| 12.5 Quality Control Reports -----                                                                          | 107  |
| 12.6 Reporting Criteria -----                                                                               | 107  |



## TABLE OF CONTENTS (cont.)

|                                                                         | Page |
|-------------------------------------------------------------------------|------|
| 12.7 Record Keeping-----                                                | 108  |
| 12.8 Records of Analysis-----                                           | 108  |
| 12.9 Standard and Reagent Traceability-----                             | 109  |
| 12.10 Standard Verification -----                                       | 110  |
| 12.11 AIHA LAP Estimation of Uncertainty -----                          | 110  |
| 12.12 Recommended Storage Conditions -----                              | 121  |
| 12.13 Handling Standards and Reagents-----                              | 121  |
| 12.14 Record Keeping Definitions -----                                  | 122  |
| 12.15 Procedures for Record Keeping -----                               | 122  |
| 12.16 Record Storage-----                                               | 123  |
| 12.17 Quality Assurance Records -----                                   | 123  |
| 13.0 CORRECTIVE ACTION AND NONCONFORMANCES -----                        | 123  |
| 13.1 Defining, Implementing & Closing Corrective Action Report -----    | 123  |
| 13.2 Procedures and Responsibilities for Corrective Action Reports----- | 132  |
| 13.3 Method Suspension or Restriction -----                             | 132  |
| 13.4 Procedure for a Project Management or Customer Service CAR -----   | 133  |
| 13.5 Exceptionally Permitted Departures from Documented Policies-----   | 134  |
| 13.6 Addressing Complaints -----                                        | 134  |
| 13.7 Immediate and Long Term Corrective Actions -----                   | 134  |
| 13.8 Responsibility for Document Control -----                          | 135  |
| 14.0 PERFORMANCE AND SYSTEM AUDITS-----                                 | 135  |
| 14.1 Purpose-----                                                       | 135  |
| 14.2 External Audits -----                                              | 135  |
| 14.3 System Audits-----                                                 | 136  |
| 14.4 Blind Sample Audits -----                                          | 137  |
| 14.5 Quality Systems and LIMS Management Review-----                    | 137  |
| 14.6 Corrective Action-----                                             | 138  |
| 15.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT -----                      | 139  |
| 15.1 Internal Reports-----                                              | 139  |
| 15.2 External Reports -----                                             | 139  |
| 15.3 Quarterly and Annual Reports -----                                 | 139  |
| 16.0 REAGENT STORAGE AND DOCUMENTATION-----                             | 139  |
| 16.1 Safety and Shelf Life-----                                         | 139  |
| 17.0 WASTE DISPOSAL -----                                               | 141  |
| 17.1 Small Quantity Generator -----                                     | 141  |
| 17.2 Procedures -----                                                   | 141  |
| 17.3 Hazardous Waste Requirements-----                                  | 141  |
| 17.4 Sample Disposal -----                                              | 141  |
| 17.5 Organic Waste Disposal -----                                       | 142  |
| 17.6 Inorganic Waste Disposal -----                                     | 142  |

## TABLE OF CONTENTS (cont.)

|                                                                          | Page |
|--------------------------------------------------------------------------|------|
| <b>APPENDICES</b>                                                        |      |
| APPENDIX I (Waste Disposal Procedures) -----                             | 146  |
| APPENDIX II (Lab Equipment Preventive Maintenance Schedule) -----        | 147  |
| APPENDIX III (Lab Equipment List) -----                                  | 150  |
| APPENDIX IV (Chain of Custody) -----                                     | 159  |
| APPENDIX V - Form 1 (QAM Training Summary Sign-off Technical) -----      | 160  |
| APPENDIX V - Form 2 (QAM Training Summary Sign-off Non-Technical) -----  | 161  |
| APPENDIX VI (Corrective Action Form) -----                               | 162  |
| APPENDIX VII (Sample Receipt Checklist) -----                            | 163  |
| APPENDIX VIII (List of all methods under which lab is Accredited) -----  | 164  |
| APPENDIX IX - Form 1 (New Employee Initial QA Manual Training) -----     | 168  |
| APPENDIX IX - Form 2 (Employee SOP / QA Manual Retraining Form) -----    | 169  |
| APPENDIX X - General QA Manual SOP Training Form) -----                  | 170  |
| APPENDIX XI (Outside Reference Documents) -----                          | 171  |
| APPENDIX XII (EMLAP Specific Requirements) -----                         | 171  |
| <b>FIGURE</b>                                                            |      |
| Figure 4-1 Organizational Chart -----                                    | 11   |
| <b>TABLES</b>                                                            |      |
| Table 5-1 Demonstration of Capability Acceptance Criteria -----          | 38   |
| Table 5-2 Laboratory Water Quality Criteria -----                        | 48   |
| Table 5-3 Risk Assessment Table and Chart -----                          | 51   |
| Table 5-4 Summary of Calibration & QC Procedures for Various Tests ----- | 53   |
| Table 8-1 Technical SOP -----                                            | 82   |
| Table 9-1 AIHA LAP Calibration and Verification Frequencies -----        | 91   |
| Table 9-3 Reference Measurement Standard List -----                      | 95   |
| Table 10-1 Laboratory Glassware Cleaning Procedures -----                | 96   |
| Table 12-1 Contributors to Measurement Uncertainty -----                 | 115  |
| Table 12-2 Expanded Measurement Uncertainty Calculation Template -----   | 118  |
| Table 12-3 Estimation of Uncertainty Requirements for non AIHA LAP ----- | 119  |
| Table 16-1 Storage of Reagents and Chemicals -----                       | 140  |
| Table 16-2 Storage Requirement Key -----                                 | 140  |
| <b>ATTACHMENTS</b>                                                       |      |
| Attachment 1 Example SOP Acknowledgement Form -----                      | 87   |
| Attachment 2 Interim (Temporary or Permanent) Change Notice -----        | 88   |
| Attachment 3 Quality Assurance Manual Acceptance Agreement -----         | 167  |
| Attachment 4 Annual Management Review Template -----                     | 176  |

## 3.0 STATEMENT OF POLICY

- 3.1 Quality Policy: The objective of Eurofins Environment Testing Southeast, LLC., Atlanta (EETSE Atlanta) is to generate high quality data in a cost effective manner, which is accurate, impartial, reliable, and adequate for its intended use. Management of EETSE Atlanta is committed to following accepted laboratory practices to achieve high quality of testing services, and strives to ensure both the analytical validity and legal defensibility of all reported data **managed so to safeguard impartiality**.

EETSE Atlanta management is committed to compliance with The NELAC Institute (TNI) Standards, AIHA LAP International Standard, **Georgia EPD** as well as North Carolina and South Carolina rules to establish, implement, and maintain a quality system appropriate to the scope of all laboratory activities, including the type, range, and volume of testing. **ISO/IEC 17025:2017 is the basis of laboratory accreditations**. Management is committed to the accepted professional laboratory practices and shall document the policies, systems, programs, procedures, and instructions to the extent necessary to enable EETSE Atlanta to assure the quality of the test results generated. Management is committed to good professional laboratory practice to meet customer requirements with quality service.

**Laboratory management has established, documented, and maintained policies for the fulfilment of the purposes of this document and shall ensure that the policies and objectives are acknowledged and implemented at all levels of the laboratory organization. These policies address the competence, impartiality, and consistency of the laboratory operations. All documentation, processes, systems, records, related to the fulfilment of the requirements of this document shall be included in, referenced from, or linked to the management system.**

Quality system documentation is communicated to, understood by, and made available to personnel through EETSE Atlanta management by means of training and educational instruction. All laboratory staff concerned with analytical testing activities must familiarize themselves with the quality documentation and implement the policies and principles in their work. **Management communicates to personnel their duties, responsibilities, and authorities**. It is the policy of EETSE Atlanta to continually improve quality systems and provide support to improvement efforts.

- 3.2 Purpose: The Quality Assurance Program (QAP) sets forth the management policy, organizational structure, and procedures for chemical analyses performed by EETSE Atlanta. Management encourages the development and use of the best testing practices as dictated by each measurement situation. However, the procedures set forth herein must be followed to the greatest extent possible. All deviations must be documented in each individual case and maintained with the sample data. The QA Manual (QAM) and all Standard Operating Procedures will be reviewed no less than annually.

Appropriate use of data generated under the varying conditions encountered in environmental analyses requires reliance on the quality control practices incorporated into the procedures. Although the EPA, state environmental protection departments, The NELAC Institute (TNI), AIHA LAP, other regulatory agencies, and clients require the use of approved methods for sampling and analysis, the mere approval of these procedures does not guarantee adequate results. Inaccuracies can result from many causes, including matrix effect, equipment malfunction, and operator error. Therefore, the quality control component of each method is indispensable and cannot be compromised.

This manual delineates the elements of the QA Program that must be implemented by all sections of the lab. These requirements outlined are the minimum requirements. Method-specific procedures and project-specific Quality Assurance Project Plans (QAPP) may require more stringent QA requirements.

### 3.3 Definitions

- 3.3.1 Quality Assurance (QA) is the total program for assuring reliability of the monitoring and measurement of data. It comprises all those planned and systematic actions necessary to provide adequate confidence that all aspects of laboratory service programs are performed in a manner satisfactory to EETSE Atlanta management and to the needs of its customers.
- 3.3.2 Quality Control (QC) is the routine application of procedures for obtaining prescribed standards of performance in the monitoring and measurement process. It covers the operational procedures, techniques, and activities that provide the means to measure, evaluate and document the quality of data obtained in the laboratory. The QC Program specifies the minimum practices, which shall be used to assure that data is produced of a known and defensible quality and within acceptable limits.

### 3.4 Fields of Testing

This manual covers methods for the analysis of aqueous, solid, waste, and air matrices currently on EETSE Atlanta scopes of accredited testing for AIHA LAP, Florida DOH, The NELAC Institute (TNI), North Carolina DENR and South Carolina DHEC. A detailed list of test methods and analytes may be found in Section 5.0, which defines the minimum level of quality assurance/quality control needed to meet required specifications. All methods carried out by EETSE Atlanta shall meet these stipulations as appropriate. In some instances, quality assurance project plans (QAPPs), project specific data quality objectives (DQOs), or local regulations may require criteria other than those stated. In these cases, the laboratory will abide by the more stringent criteria, following a review and acceptance of the requirements by the Laboratory Manager and the Quality Assurance Manager.

### 3.5 Management of the Quality Assurance Manual

This manual was prepared in accordance with the current The NELAC Institute (TNI) standards and AIHA LAP requirements. It also follows guidelines set by the U.S. Environmental Protection Agency, Florida DOH and ISO/IEC 17025. Tests are always carried out in accordance with stated methods and customers' requirements. Further, the laboratory can be legally responsible as it carries out testing in such a way to meet the requirements of this International Standard and to satisfy the needs of the customer, the regulatory authorities or organizations providing recognition. The management system shall cover work carried out in the laboratory's permanent facilities.

- 3.5.1 The QA manual is reviewed annually by the Quality Assurance Manager and laboratory personnel to confirm that it reflects current in-house practices and meets all the requirements of both EETSE Atlanta's clients and accrediting agencies. Modifications may be made in order to correct inconsistencies, implement improvements, encompass new concepts or procedures, adapt to new regulations, or update any changes in state or national policies or standards. The Quality Assurance Manager, Laboratory Manager, Technical Director, and relevant operational staff review the changes before they are integrated into the QA manual.
- 3.5.2 Policies or procedures in the manual which demand immediate attention are addressed through the use of temporary and permanent Interim Change Notices as described in Section 8.

### 3.6 Control of the Quality Assurance Manual

The Quality Assurance Manual is considered confidential within Eurofins Environment Testing Southeast, LLC., Atlanta. It may not be altered in any manner by anyone other than the Quality Assurance Manager, the Laboratory Manager, or an employee duly appointed by either of the aforementioned. The manual shall be marked as an "Uncontrolled Copy" if provided to external users or regulators. It is intended for the exclusive purpose of the review of EETSE Atlanta's quality systems and shall not be used in any other way without written permission of the Business Unit Manager, Laboratory Manager, or Quality Assurance Manager.

### 3.7 Order of Precedence

In the event of a conflict or discrepancy between policies, the order of precedence shall be as follows:

1. Eurofins Atlanta Interim Change Notice
2. Quality Assurance Manual
3. Standard Operating Procedures
4. Other (memos, charts, published methods, etc.)

## 4.0 ORGANIZATION AND RESPONSIBILITY

- 4.1 Organization: Eurofins Environment Testing Southeast, LLC. Atlanta (EETSE Atlanta) was established in 1992 in Atlanta, Georgia, an environmental testing laboratory dedicated to providing superior quality data. The laboratory is one of the largest independent environmental laboratories in the Southeast comprised of highly skilled scientists and experts in the field of environmental testing who are dedicated to providing superior quality analytical data.

The professionals at the laboratory perform chemical and biological testing on a variety of environmental samples. These include solid waste matrices, soils, sediments, fibrous wastes, polymeric emulsions, filter cakes, spent carbons, spent catalysts, air sampling media, ground, surface and waste waters, aqueous sludges, caustic liquors, acid liquors, waste solvents, oily wastes, and tars.

- 4.2 Organizational Structure: The relationship between management, technical operations, support services and quality system is as follows: Laboratory Operations, Quality Assurance Department, Technical Director, and Customer Service Department report to the Business Unit Manager, who in turn reports to the company President. The organizational structure of EETSE Atlanta provides for an independent Quality Assurance Department with the overall responsibility of developing and auditing for compliance to a comprehensive Quality Assurance Program. The QA Department has the authority and organizational freedom to ensure that QA activities are implemented and accomplished. The Quality Assurance Manager reports directly to the Business Unit Manager of EETSE Atlanta.

- 4.2.1 Because of the breadth of knowledge required to produce quality data, the cooperation of numerous individuals is required. All assigned personnel shall remain diligent to identify, report, and promptly rectify issues or events affecting data quality as they occur. To encourage the identification of these situations, management at all levels shall promote continuous quality improvement throughout the entire company. These events and their resolutions must be verified and substantiated as required by this document and any other applicable QA guidelines.

Laboratory personnel have the authority and resources to carry out their duties, which include

- implementation, maintenance and improvement of the management system
- identification of deviations from the management system or from laboratory procedures
- initiation of actions to prevent or minimize such deviations
- reporting the effectiveness of the management system and laboratory activities
- Identifying needs for improvement

- 4.2.2 The establishment of a Quality Assurance Program requires the services of all the employees of EETSE Atlanta in order to carry out the monitoring, record keeping, statistical techniques, and other functions required by the system. This total commitment of all personnel to the production and reporting of reliable data is dependent upon the conscientious effort of everyone involved. It is important, therefore, that each member of the organization have a clear understanding of his duties, responsibilities, and relationship to the total effort.

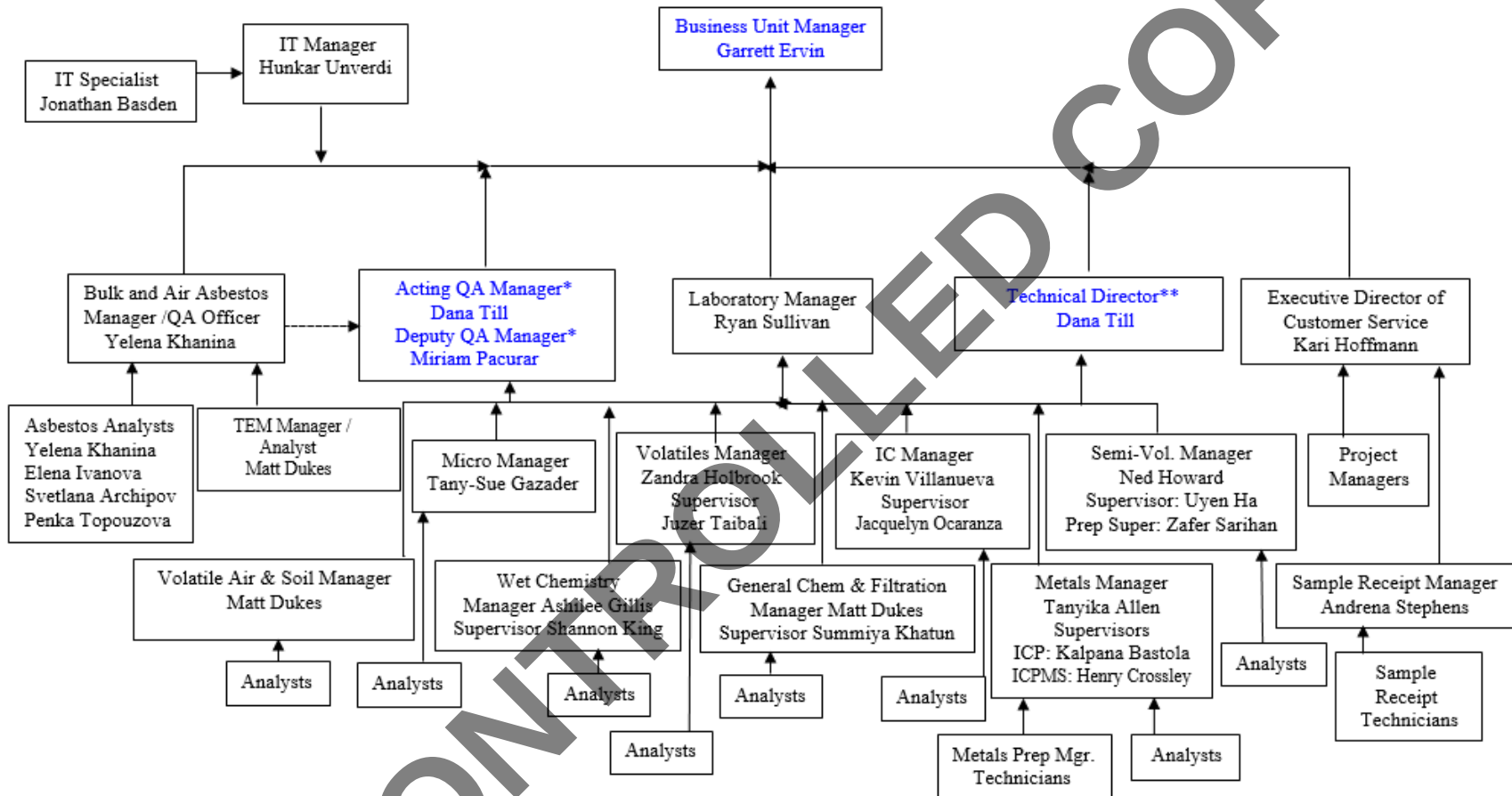
#### 4.3 Organizational Chart

The organizational structure at EETSE Atlanta is documented in the form of an Organizational Chart, Figure 4-1, which identifies personnel involved in the production of quality data. Lines of communication and responsibility exist throughout the entire company. Employees are provided routine communication in the form of training, lectures, meetings, and emails to focus on customer needs, regulatory requirements and to maintain an effective management system. This communication and internal monitoring allows for the integrity of the management system to be maintained when changes are implemented.

UNCONTROLLED COPY



**FIGURE 4-1**  
**ORGANIZATIONAL CHART**



\*TNI: The QA Managers will serve as deputy in the event of the Technical Director's absence.

**\*\*TNI:** The Technical Director will serve as deputy in the event of the QA Managers' absence.

For AIHA-LAP LLC accreditation: The Laboratory Technical Director will serve as deputy for the IHLAP and ELLAP Technical Manager. The Laboratory Technical Director will also serve as deputy for the IHLAP and ELLAP Quality Assurance Manager. The Laboratory Quality Assurance Manager will serve as deputy for the EMLAP Microbiology Technical Manager and the Microbiology Quality Assurance Coordinator.

## 4.4 Responsibilities and Position Requirements

It is the responsibility of all EETSE Atlanta employees to implement the Quality Assurance Program effectively. The roles and responsibilities of the technical management and the Quality Assurance Manager to ensure compliance with the regulatory standards (including AIHA LAP and NELAC) are outlined in the position descriptions below. All chemists and technicians are responsible for understanding and following the measures of the QA program, and for reporting any quality failures to a Manager or Supervisor in a timely manner. Supervisors and Managers are responsible for ensuring that all laboratory personnel are familiar with the requirements of the Quality Assurance Program and that these requirements are implemented and maintained. It is the responsibility of the Supervisor to ensure that all laboratory personnel are trained to perform their assigned tasks. It is the responsibility of each Supervisor to ensure that any quality failures are reported to the Quality Assurance Department immediately.

The essential personnel involved in the implementation of and/or monitoring of the Quality Assurance Program are identified in the following sections.

### 4.4.1 Business Unit Manager

The **Business Unit Manager** is responsible for the overall operation of the laboratory and reports directly to the company President. The Business Unit Manager ensures that all of the resources are available to implement and follow the procedures and policies as written in the EETSE Atlanta QA Manual for compliance with The NELAC Institute (TNI) Standards, National Voluntary Laboratory Approval Program (NVLAP), AIHA LAP International Standard, Georgia EPD, North Carolina, and South Carolina rules and regulations. The Business Unit Managers reviews, approves the EETSE Atlanta Quality Assurance Manual, and authorizes the Quality Assurance Manager to perform internal audits on behalf of the company.

The Business Unit Manager will conduct the annual management review of laboratory operations to assess the effectiveness of policies and procedures in order to implement changes where deemed necessary. The agenda of the annual meeting will include reports from all department supervisors and cover such topics as quality assurance, accreditations, documentation, changes in the laboratory, equipment and maintenance needs, results of audits etc. The topics to be discussed will be determined by the Business Unit Manager, Laboratory Manager, and Quality Assurance Manager. A current list of topics is presented in Attachment 4.

### 4.4.2 Laboratory Manager

The Laboratory Manager is responsible for the daily operations within the analytical sections of the laboratory. If the Laboratory Manager is absent for a period of time exceeding 15 consecutive calendar days, the Business Unit Manager must designate another full-time staff member meeting the qualifications of the Laboratory Manager to temporarily perform this function. In case of a change of Laboratory Manager, all necessary, accrediting authorities must be notified in writing within thirty days. The following is the position description for Laboratory Manager:

#### Position Description and Requirements

Position Title: Laboratory Manager

Position Description: This position is responsible for the following:

- Oversees the daily operations of the laboratory.
- Ensures that client specific reporting & quality control requirements are met.
- Works with the Project Managers and Department Managers to ensure project objectives are met in a timely manner.

- Sets goals and objectives for both the business and the laboratory employees.
- Provides direction to departmental managers to steer all departmental efforts toward the overall corporate production goals.
- Discusses and resolves disagreements, as necessary, with laboratory personnel.
- Coordinates any unresolved concerns between the project managers and the departmental supervisors.
- Ensures that all analysts and supervisors have the appropriate education & training to properly carry out the duties assigned to them, and ensures that this training has been documented.
- Ensures that a sufficient number of qualified personnel are employed to supervise and perform the work of the laboratory.
- Ensures that HR policies are adhered to and maintained.
- Ensures management's commitment to compliance with The NELAC Institute (TNI) Standards
- Ensures compliance with International Standard ISO/IEC 17025
- Hires key personnel and recruits professional talent.
- Reviews and approves all SOPs prior to their implementation and ensures all approved SOPs are implemented and adhered to.
- Schedules analytical operations.
- Supervises the maintenance of instruments and the scheduling of repairs.
- Ensures that appropriate corrective actions are taken to address analyses as requiring such actions by internal & external performance or procedural audits.
- Ensures that personnel are free from any commercial, financial or other undue pressures that which adversely affect the quality of their work.
- Supervises the preparation & maintenance of laboratory records.
- Responsible for holding documented meetings as needed with the departmental supervisors.

**Position Requirements:** BA or BS in Chemistry, Microbiology, Biology, Environmental Science or other related degree. Must have 2-5 years of experience of as duties described above.

#### 4.4.3 Quality Assurance Manager Positions

##### 4.4.3.1 Acting Quality Assurance Manager

The QA Manager is responsible for establishing a Quality Assurance Program that meets the quality assurance objectives of the company, and its clients. If the QA Manager is absent for a period of time exceeding 15 consecutive calendar days, the Business Unit Manager must designate another full-time staff member meeting the qualifications of the QA Manager to temporarily perform this function. In case of a change of QA Manager, all necessary accrediting authorities must be notified in writing within thirty days. The following is the position description for Quality Assurance Manager:

#### Position Description and Requirements

Position Title: Quality Assurance Manager

Position Description: This position is responsible for the following:

- Directs all corporate quality assurance (QA).
- Responsible for developing and maintaining all QA systems and documentation.
- Responsible for all aspects of the State and Federal Certification processes.
- Maintains records of acceptable performance of MDLs.
- Directs management to compliance to the AIHA LAP Accreditation Policies
- Directs management to compliance with The NELAC Institute (TNI) Standards

- Ensures compliance with International Standard ISO/IEC 17025
- Has authorization from company Business Unit Manager to conduct internal audits
- Maintains all quality control charts.
- Has direct access to the Technical Director and to the highest level of management where decisions are made on laboratory policy and resources.
- Serves as focal point for QA/QC; has responsibility for the oversight and review of QC data.
- Functions independently from laboratory operations for which QA oversight is held.
- Evaluates data objectively and performs assessments without outside influence.
- Performs periodic reviews of test reports under AIHA LAP according to the LQSR.
- Conducts internal audits on the entire laboratory technical operation annually.
- Notifies laboratory management of deficiencies in the quality system and monitors corrective action.
- Maintains currency of the QA manual.
- Responsible for preparing/submitting a quarterly report to upper management.
- Serves as deputy in the event of the Technical Director's absence.

Position Requirements: Must have a BA or BS in Chemistry, Microbiology, Biology, Environmental Science or any other related degree. Must have 2-5 years of experience carrying out the duties described above.

## 4.4.3.2 Deputy Quality Assurance Manager

Acting and Deputy Quality Assurance Managers for EETSE Atlanta are responsible for establishing a Quality Assurance Program that meets the quality assurance objectives of the company and its clients. They direct all corporate quality assurance, develop and maintain all QA systems and documentation, and are responsible for all aspects of the State and Federal Certification process. They function independently from laboratory operations for which QA oversight is held to objectively evaluate data and perform assessments without outside influence. Additionally, they maintain currency of the QA Manual, conduct internal audits on the entire laboratory technical operation and maintains all quality control charts.

Also, Deputy Quality Assurance Manager takes on many of the duties of the Quality Assurance Department. This includes administration of accreditations, management of the proficiency testing programs, oversight of routine laboratory controls (such as thermometer, pipettor, and balance calibrations), monitoring of in-house QA Department projects and studies, tracking and posting of various QA correspondence and documentation, performance of internal audits, addressing Risk Management and QA Department Corrective Action Reports, Quality Assurance training, and the administration of annual MDL studies.

## 4.4.4 Department Director (If Applicable)

The Department Director reports to the Business Unit Manager / Laboratory Manager and is responsible for the administrative functions within the assigned department(s). This includes but is not limited to non-production activities such as monitoring Demonstrations of Capabilities, oversight of Standard Operating Procedure updates, Method Detection Limits Studies, as well as departmental instrument maintenance and quality assurance assignments. In addition, the Department Director is responsible for assuring adequate staffing and training. The following is the position description for Department Director:

## Environment Testing

### Position Description and Requirements

Position Title: Department Director (When Applicable)

Position Description: This position is responsible for the following:

- Oversees the daily operations of the laboratory.
- Ensures that client specific reporting & quality control requirements are met.
- Works with Project Managers/Group Leaders to ensure project objectives are met in a timely manner.
- Sets goals and objectives for both the business and the laboratory employees.
- Provides direction to departmental managers to steer all departmental efforts toward the overall corporate production goals.
- Discusses and resolves disagreements, as necessary, with laboratory personnel.
- Coordinates any unresolved concerns between the project managers & the departmental supervisors.
- Ensures that all analysts and supervisors have the appropriate education & training to properly carry out the duties assigned to them, and ensures that this training has been documented.
- Ensures that a sufficient number of qualified personnel are employed to supervise and perform the work of the laboratory.
- Ensures that HR policies are adhered to and maintained.
- Ensures management's commitment to compliance with The NELAC Institute (TNI) Standards
- Hires key personnel and recruits professional talent.
- Reviews and approves all SOPs prior to their implementation and ensures all approved SOPs are implemented and adhered to.
- Schedules analytical operations.
- Supervises the maintenance of instruments and the scheduling of repairs.
- Ensures that appropriate corrective actions are taken to address analyses as requiring such actions by internal & external performance or procedural audits.
- Ensures that personnel are free from any commercial, financial or other undue pressures that which adversely affect the quality of their work.
- Supervises the preparation & maintenance of laboratory records.
- Responsible for holding documented meetings as needed with the departmental supervisors.

Position Requirements: A Degree or the necessary experience to achieve the requirements outlined in the position description. Must have 2-5 years of experience carrying out the duties described above.

#### 4.4.5 Technical Director

The Technical Director exercises daily supervision of laboratory procedures and the reporting of results. If the Technical Director is absent for a period of time exceeding 15 consecutive calendar days, the Business Unit Manager must designate another full-time staff member meeting the qualifications of the Technical Director to temporarily perform this function. In case of a change of Technical Director, all necessary accrediting authorities must be notified in writing within thirty days. The following is the position description for Technical Director:

### Position Description and Requirements

Position Title: Technical Director

Position Description: This position is responsible for the following:

- Updates SOPs as required.
- Maintains Test Codes
- Ensures that all employees are properly trained



- Reviews and approves revisions to the Quality Assurance Manual.
- Maintains records of employee training including acceptable performance of IDOCs.
- Provides technical assistance in the development of new methods.
- Responsible for following direction given by the Business Unit Manager.
- Ensures management's commitment to compliance with The NELAC Institute (TNI) Standards
- Ensures compliance with International Standard ISO/IEC 17025
- Provides technical guidance to analytical staff.
- Assists with internal and external audits.
- Ensures that appropriate corrective actions are taken to address analyses identified as requiring such actions by internal and external performance or procedural audits.
- Oversees equipment maintenance and repair.
- Assists the Laboratory Manager in the investigation of new technologies and proposed equipment acquisitions by the laboratory.
- Serves as deputy in the Quality Manager's absence.

**Position Requirements:** A Bachelor's Degree in chemical, environmental, biological, or physical sciences or engineering, with at least 24 college semester credit hours in chemistry and at least two years of experience in the environmental analysis of representative inorganic and organic analytes for which the laboratory seeks or maintains accreditation. A Masters or Doctoral Degree may be substituted for one year of experience.

#### 4.4.6 Microbiology Lab Manager

Microbiology Lab Manager reports to the Lab Manager on all aspects of sample processing. The Microbiology Lab Manager is responsible for managing Microbiology Analysts.

#### Position Description and Requirements

**Position Title:** Microbiology Lab Manager

**Position Description:** This position is responsible for the following:

- Training and qualification of personnel (under their supervision) on procedures.
- Monitors necessary protocols and standard operating procedures, including control charts.
- Maintains QC within their area of responsibility.
- Ensures that personnel (under their supervision) use approved procedures, and maintain all QC.
- Recommends and implements new or revised QC policies as approved by the QA Manager.
- Assists in reviewing departmental requirements and monitoring maintenance requirements.
- Reviews data and QC results, and reports non-conformances to the appropriate QA Manager, Technical Manager, and/or Business Unit Manager.
- Provides guidance to analysts in resolving problems encountered daily during sample preparation and analysis, in conjunction with the Technical Director or Quality Assurance Manager.
- Ensures all logbooks are maintained and current.
- Maintains adequate and valid inventory of reagents, standards, spare parts, and other relevant resources required to perform daily analysis.
- Assists Technical Director with Demonstrations of Capability.

**Position Requirements:** A Degree (typically Microbiology, Biology or equivalent) or the necessary experience to achieve the requirements outlined in the position description.



### 4.4.7 Microbiology Analyst

The Microbiology Analyst training required is described in detail in the Employee Training Files maintained by the Technical Director.

#### Position Description and Requirements

Position Title: Microbiology Analyst

Position Description: This position is responsible for the following:

- Performs analyses by adhering to analytical and quality control protocols prescribed by SOPs, the QA manual, and project specific requirements (e.g. data packages).
- Documents standard and sample preparation, instrument maintenance, calculations, and any observed non-conformances on work lists, bench sheets, or laboratory logbooks.
- Reports all out-of-control situations, instrument problems, matrix problems, and QC failures, which might affect the reliability of the data, to their respective supervisors or the QA Manager.
- Reviews data generated and submits it to the departmental supervisor prior to entering and submitting the data to the next level of review.

Position Requirements: At a minimum, analysts must have a high school diploma or equivalent or the necessary experience to meet the requirements of the position description.

### 4.4.8 Technical Assistant

The Technical Assistant reports directly to the Technical Director and assists with the implementation and maintenance of all programs assigned to the Technical Director.

#### Position Description and Requirements

Position Title: Technical Assistant

Position Description: This position is responsible for the following:

- Schedules, tracks and provides preliminary document review for DOC studies.
- Performs SOP updates as instructed from Tech. Director.
- Maintains SOP document control system.
- Scans and publishes completed documents to Portal Server for archiving.
- Schedules and documents training sessions and staff meetings held by Tech. Director.
- Assists Tech. Director with development of training program content and media.
- Assists Tech. Director with day-to-day functions of the Tech. Direction Dept. as needed.

Position Requirements: A Bachelors Degree in a science or engineering based major.

### 4.4.9 Director of Project Management

The Director of Project Management serves as a liaison between the laboratory and its clients ensuring the delivery of reports and data packages. The following is the position description:

#### Position Description and Requirements

Position Title: Director of Project Management

Position Description: The Director of Project Management serves as a liaison between the laboratory and its clients, and ensures delivery of data packages. Responsibilities include:

- Meets client specifications by communicating project and QA requirements to the laboratory.
- Assigns project managers.
- Notifies laboratory personnel of incoming projects and sample delivery schedules and requirements.

- Monitors status of data package projects in-house to ensure timely and accurate delivery of reports.
- Informs clients of data package related problems and resolves service issues.
- Coordinates requests for sample containers and other services such as data packages.
- Reviews and approves, with input from the Business Unit Manager, proposals for marketing.
- Reviews laboratory data reports and quotes.

Position Requirements: A Degree or the necessary experience, 2 years management or supervisory experience, strong computer and personnel skills, knowledge of the environmental and chemical sciences, and previous project management experience.

#### 4.4.10 Project Manager

The Project Manager is responsible for directly ensuring that the individual client's needs are met on a project-by-project basis with respect to the laboratory's QA program and any project-specific QA programs. The Project Manager is responsible for disseminating any project-specific information to the Laboratory Manager and/or Laboratory Director. Non-routine QA requirements must be approved by the Laboratory Director and Laboratory Manager. The following is the position description for Project Manager:

##### Position Description and Requirements

Position Title: Project Manager

Position Description: This position is responsible for the following:

- Ensures effective and accurate communication between the client and the laboratory.
- Handles all client requests and needs.
- Utilizes any corporate documents to consult with clients about client questions or concerns.
- Responsible for notifying the Director of Project Management of any client activities that entail services that are not currently performed by EETSE Atlanta.
- Assesses client requests with consultation with the Director of Project Management.
- Develops and maintains client records and requirements.
- Ensures that the laboratory is aware of, and completes, all client requests and requirements.
- Responsible for meeting with the Marketing Manager, Director of Project Management, and Business Unit Manager on a periodic basis for marketing purposes.
- Communicates proper sampling, shipping, and receiving procedures to clients.
- Documents client interaction and maintains client information in the Project Management System.
- Reviews and approves data reports prior to their release to the clients.
- Ensures client specific reporting and quality control requirements are met.

Position Requirements: A Degree or the necessary experience to achieve the position requirements outlined in the Position Description.

#### 4.4.11 Department Manager

Oversees operation of departments, supervises employees, & addresses issues in the departments

##### Position Description and Requirements

Position Title: Department Manager

Position Description: This position is responsible for the following:

- Supervise employees to ensure they are working to full potential and being productive at all times.

- Handle all personnel issues, i.e. conflict between workers, inappropriate behavior, schedule changes, time-off requests, etc...
- Write warnings if needed.
- Ensure employee's time sheets reflect actual work schedule.
- Make sure clock in-out times are accurate.
- Make sure employees are coming to work at the designated time.
- Monitor employee breaks.
- Assign tasks to personnel using the Task Management software.
- Grade task upon completion, this is to be included in the employee's Performance Evaluation.
- The use of this software will also be used in performing supervisor's Performance Evaluation.
- Perform Employee Performance Evaluations on all employees in department.

### Production responsibilities:

- Maintain backlog to ensure all samples are completed within holding time, due date, and that all special requirements are met.
- Keep track of inventory and order supplies as needed.
- Sufficient amounts of reagents, solvents, standards, etc... must be kept at all times so production is not affected because of a shortage of supplies.
- Identify and solve problems within the department including, but not limited to equipment, tests performed, and any other issues resulting from the preparation/analysis of samples.
- A supervisor is required to stay until problems are solved or rush work is completed to within a reasonable amount of time or hour (this includes staying late and working weekends.)
- Delegate work to employees.
- Assign batches and/or tests.
- Assign new tests to employees so workload can be spread evenly among staff.
- Assign duties to employees, i.e. ordering of supplies, logging in new supplies, etc...

### QA Responsibilities:

- Ensure all employees are properly trained and DOC's performed.
- Ensure all CDOC's are performed on a yearly basis for all employees and for all tests.
- Ensure MDL's are completed/prepped yearly, more often where applicable, or as needed due to instrument changes/maintenance.
- Complete PT samples in a timely manner and identify any issues with test as soon as possible.
- If necessary, coordinate preparing/running of Proficiency samples with associated departments to ensure their timely completion and enough samples remain for all tests.
- QA review any data generated within department.
- [Assists in reviewing departmental requirements and monitoring maintenance requirements.](#)
- Review and revise SOP's when necessary.
- Ensure batches, logbook pages, raw data, & paperwork are scanned & posted to the Portal Server.

**Position Requirements:** A Bachelor's Degree preferably in chemical, environmental, biological, physical sciences, engineering, or other scientific discipline and at least two years of experience in the environmental analysis similar to that which will be overseen.

### 4.4.12 Supervisors

Assists with operation of departments and supervision of employees and report to the managers.

#### Position Description and Requirements

Position Title: Supervisors

Position Description: Supervisors report to their respective Manager on all aspects of sample processing. If a section does not have a supervisor, the Manager of that section functions as the supervisor. The Supervisor's responsibilities include, when applicable:

- Training and qualification of personnel (under their supervision) on procedures.
- Monitors necessary protocols and standard operating procedures, including control charts.
- Maintains QC within their area of responsibility.
- Ensures that personnel (under their supervision) use approved procedures, maintain all instrument QC.
- Recommends and implements new or revised QC policies as approved by the QA Manager.
- Assists in reviewing departmental requirements and monitoring maintenance requirements.
- Reviews all data and QC results, and reports non-conformances to the appropriate QA Manager, Technical Manager, and/or Business Unit Manager.
- Provides guidance to analysts in resolving problems encountered daily during sample preparation and analysis, in conjunction with the Technical Director or Quality Assurance Manager.
- Ensures all logbooks are maintained and current.
- Maintains adequate and valid inventory of reagents, standards, spare parts, and other relevant resources required to perform daily analysis.
- Assists Technical Director with MDLs and IDOCs.

Position Requirements: Degree or the necessary experience to achieve the requirements outlined in the position description. Two plus years of experience considered in lieu of a degree.

### 4.4.13 Analysts

Analysts are responsible for performing the various testing, digestive, and extractive procedures required in the laboratory.

#### Position Description and Requirements

Position Title: Analysts

Position Description: Each type of analyst position and the specific training required is described in detail in the Employee Training Files maintained by the Technical Director. In general, analysts are responsible for the following duties:

- Performs analyses by adhering to analytical and quality control protocols prescribed by SOPs, the QA manual, turnaround times, rush analyses and short hold analyses, and project specific requirements (e.g. data packages).
- Documents standard and sample preparation, instrument calibration and maintenance, calculations, and any observed non-conformances on work lists, bench sheets, or laboratory notebooks.
- Reports all out-of-control situations, instrument problems, matrix problems, and QC failures, which might affect the reliability of the data, to their respective supervisors or the QA Manager.
- Reviews all data generated prior to entering and submitting the data to the next level of review.
- Suggests method improvements to their supervisor, Technical Director, or the QA Manager for potential incorporation into SOPs.

Position Requirements: At a minimum, analysts must possess a high school diploma or equivalent. If the analyst operates equipment, the analyst must satisfactorily complete a short course

## Environment Testing

offered by an equipment manufacturer, professional organization, university, or other qualified training facility (in-house training is acceptable).

### 4.4.14 Project Manager Assistant

Project Manager Assistants are responsible for providing assistance to project managers with the production and completion of data packages.

#### Position Description and Requirements

Position Title: Project Manager Assistant

Position Description: Project manager assistants report to the project managers. This position is primarily responsible for assisting project managers with on time completion of all data packages and to ensure effective and accurate communication between lab and project managers with respect to data package status. In general project manager assistants are responsible for the following duties:

- Assigns data packages and completion deadlines to appropriate lab departments.
- Responsible for initial data package review after data package was completed by lab departments
- Responsible of notifying project managers or Director of Project Management of any internal problems or discrepancies that may affect data package on time completion.
- Responsible for formatting data package (inserting dividers, making table of contents, copying reports, COC and checklist, putting all data in appropriate order, etc);
- Responsible for setting bookmarks and creating CD ROM's, completing and updating data package status document (located on the EETSE Atlanta Server) on the daily basis, and ensures that data package was scanned or copied after approved by the project manager

Position Requirements: A Degree or the necessary experience to achieve the requirements outlined in the position description.

### 4.5 Improper, Unethical, or Illegal Actions; Data Integrity System; and Confidentiality of Client Information and Proprietary Rights

- 4.5.1 It is recognized that the quality assurance program is an inherent function involving all of the organizational components and personnel. The achievement of quality objectives is attained by each individual performing assigned work in strict compliance with approved and applicable requirements and procedures.
- 4.5.2 For a quality assurance program to succeed, it is imperative that all employees adhere to procedures which detect and prevent improper, unethical, or illegal actions which could in any way compromise the reliability and data integrity. Training in legal, ethical, data integrity, and confidentiality of client information and proprietary rights responsibilities is mandatory. Records are maintained that document, through individual signatures, that every employee understands the consequences of improper, unethical, or illegal actions related to data integrity. Potential instances of improper, unethical, illegal actions or Data Integrity issues will be discussed and addressed in senior management meetings.

The laboratory will inform the clients, of the information it intends to place in the public domain. Except for information that the customer makes publicly available, or when agreed between the laboratory and the customer (e.g. for the purpose of responding to complaints), all other information is considered proprietary information and shall be regarded as confidential. Personnel acting on the laboratory's behalf, shall also keep confidential all information obtained or created during the



performance of laboratory activities, except as require by law. The laboratory is responsible for management of all information obtained or created during the performance of laboratory activities. Information about the customer obtained from sources other than the customer (e.g. complainant, regulators) shall be confidential between the customer and the laboratory. The provider (source) of this information shall be confidential to the laboratory and shall not be shared with the customer, unless agreed by the source.

- 4.5.3 Improper actions are defined as deviations from method-specified or client-specified analytical or quality assurance practices. These events may be intentional or unintentional. Disciplinary measures may include verbal warnings, written warnings, and/or dismissal.
- 4.5.4 Unethical or illegal actions are defined as the deliberate falsification or alteration of analytical or quality assurance results where failed method, quality control, or client specifications are made to appear acceptable. These actions affect the integrity of the data. Also included as unethical or illegal actions is the falsification and reporting of data where analyses were never performed. Disciplinary measures may include verbal warnings, written warnings, and/or dismissal. Findings of fraud may be prosecuted to the fullest extent of the law.
- 4.5.5 Employee training of legal, ethical, and data integrity responsibilities establishes the program and procedures that prevent and detect improper, unethical, or illegal actions by employees. Deterrence begins with a position of zero tolerance established by management. Employee training supports and sustains the policy.
  - 4.5.5.1 Training of laboratory employees with respect to their legal and ethical responsibilities is comprised of three basic components:
    - 4.5.5.1.1 The definition of improper, unethical, or illegal actions.
    - 4.5.5.1.2 The elements of the laboratory's prevention and detection program.
    - 4.5.5.1.3 Some examples of inappropriate laboratory practices that affect data integrity.
  - 4.5.5.2 Training courses in legal and ethical responsibilities also include the potential punishments and penalties for fraudulent conduct.
- 4.5.6 Laboratory management implements a variety of proactive measures to promote the prevention and detection of improper, unethical, or illegal activities. Minimum requirements are included in the quality program by means of the following:
  - 4.5.6.1 An ethics and data integrity policy that is read and signed by all personnel.
  - 4.5.6.2 Initial and annual ethics and data integrity training.
  - 4.5.6.3 Internal audits.
  - 4.5.6.4 Anti-fraud language in client contracts and project agreements, where applicable.
  - 4.5.6.5 Analyst notation and signature on manual integration changes to data and/or calculations.
  - 4.5.6.6 Mandatory use of electronic and computer software audit functions wherever possible.
  - 4.5.6.7 A no-fault policy encourages employees to come forward and report fraudulent activities.



- 4.5.7 Employees are provided routine communications in the form of training, lectures, and updates in policy that are intended to reduce illicit behavior.
- 4.5.8 Any of the following means may be used to monitor the quality and validity of test results:
- 4.5.8.1 Internal quality control samples.
  - 4.5.8.2 Interlaboratory comparisons or proficiency test studies.
  - 4.5.8.3 Certified reference materials or internal quality control using secondary reference materials.
  - 4.5.8.4 Replicate tests using the same or different methods.
  - 4.5.8.5 Re-testing of retained samples.
  - 4.5.8.6 Correlation of results for different characteristics of a sample.
- 4.5.9 Examples of inappropriate practices include the following:
- 4.5.9.1 Failure to properly record and preserve data: Analysts must be able to clearly demonstrate how analytical values were obtained from the associated raw data. Such documentation shall be maintained by the laboratory and be available to data users or auditors at any time. This includes failure to document data in the original logbook or on the original company form. Transferring data from a scratch paper or note paper to the logbook or company form is never allowed. The data must be recorded in the appropriate document at the time the test or preparation is being performed by the person performing the test. Failure to comply with this will result in disciplinary measures up to and including dismissal.
  - 4.5.9.2 Failure to properly document errors: All errors, mistakes, and justifications for manual integrations must be fully explained within the case narrative of the final report.
  - 4.5.9.3 Failure to initiate corrective actions: Analysts having knowledge of any part of an analysis or procedure that requires corrective action must immediately notify management.
  - 4.5.9.4 Failure to report a missed holding time: Samples analyzed outside of allowed holding times must not be reported without qualifying the data, and some results may be unusable due to lack of validity. Backdating an analysis to save a missed hold time is forbidden.
  - 4.5.9.5 Failure to follow methods or SOPs as written: Methods and standard operating procedures must be followed without deviation. Analysts must immediately submit any changes to the Technical Director for revisions.
  - 4.5.9.6 Signing another person's signature to documentation.
- 4.5.10 Improper, unethical, and illegal actions are considered fraudulent because they affect the integrity of the data. Gross deviations from specified procedures will be investigated for potential improper, unethical, illegal actions and data integrity issues. Findings of fraud may be prosecuted to the fullest extent of the law. The following are examples of improper, unethical, and illegal conduct that affect data integrity:
- 4.5.10.1 Improper use of manual integrations to meet calibration or method Quality Control criteria, such as peak shaving or peak enhancement, if performed solely to meet QC requirements.
  - 4.5.10.2 Falsification of results to meet method requirements.
  - 4.5.10.3 Reporting of results without analyses to support the data or reporting results from the analysis of one sample for those of another.

- 4.5.10.4 Selective exclusion of data to meet QC criteria, such as dropping calibration points without technical or statistical justification.
- 4.5.10.5 Misrepresentation of laboratory performance by falsifying calibration data or QC.
- 4.5.10.6 Citing matrix interference as a basis for exceeding acceptance limits, especially without initiating corrective actions, in interference-free matrices.
- 4.5.10.7 Unwarranted manipulation of computer software such as subtracting or not subtracting a blank or background, altering chromatographic baselines, or improper background subtraction (GC/MS) to comply with ion abundance criteria in to meet QC requirements.
- 4.5.10.8 Improper alteration of analytical conditions, such as modifying an EM voltage or changing a GC temperature program to induce a shorter analytical run time, which makes the standard analysis different from the sample analysis.
- 4.5.10.9 Misrepresentation of QC samples, such as adding surrogates after sample extraction, omitting sample preparation steps for QC samples, over-spiking, or under-spiking.
- 4.5.11 The Data Integrity System (a.k.a. Legal & Ethical Training SOP) is reviewed annually as part of the annual management review.
- 4.5.12 To ensure confidentiality of data integrity issues, a chain of command policy has been adopted. Employees are encouraged to bring data integrity issues to their immediate supervisor. If the supervisor is a part of the data integrity issue, then the employee brings the issue to the Laboratory Manager, who is part of upper management. In the absence of the Laboratory Manager, the issue is brought to either the Quality Assurance Manager or the Technical Director. A confidential meeting with the Human Resources Manager may take place to resolve the issue. Discussions will take place outside the laboratory and in upper management's office(s) to again help ensure confidentiality.
- 4.5.13 Employees are also trained the importance of Confidentiality of Client Information and Proprietary Rights. Employees are taught as part of their Legal & Ethical Training that they should not discuss client information, events, knowledge of investigations, information about the client obtained from sources other than the client or results outside the work place. This information is considered confidential. Further, they are informed that failure to comply is a violation of their Data Integrity training and is considered grounds for termination of employment.
- 4.6 Undue Internal and External Pressures and Impartiality
  - 4.6.1 EETSE Atlanta, Inc. strives for the highest caliber of laboratory performance in conjunction with accomplishing quality objectives. One component of realizing this goal is to protect laboratory personnel from undue internal and external pressures.
  - 4.6.2 The laboratory shall be responsible for the impartiality of its laboratory activities and shall not allow commercial, financial or other pressures to compromise impartiality. If a risk to impartiality is identified, the laboratory shall be able to demonstrate how it eliminates or minimizes such a risk.
  - 4.6.3 At EETSE Atlanta, Inc. analysts and technicians are insulated from work-related undue pressures that would compromise the quality of their work. Management is aware and considerate of these internal pressures such as management burdens and project deadlines, and of external stresses such as customer complaints and priority requests for analysis.
  - 4.6.3 Management policy is to remain supportive of laboratory personnel and aware of their workloads and the demands placed upon them. Precautions are taken to ensure that there are no conflicts of interest

between staff and clients. For example, priority requests, complaints, or status of work inquiries are directed through supervisors, managers, or administrative personnel.

- 4.6.4 Internal complaints and concerns expressed by employees are handled by EETSE Atlanta' policy of encouraging free communication with all levels of management. An "open door" approach promotes avenues of communication that could prevent improper conduct or data integrity issues resulting from undue external and internal pressures. Reducing workload for individual employees may include assigning additional personnel to assist in heavily backlogged areas, providing supplies, or equipment, or affording technical assistance and resources.

#### 4.7 Responsibility for QA Program Adherence

- 4.7.1 It is the responsibility of all EETSE Atlanta employees to implement the Quality Assurance Program effectively. All chemists and technicians are responsible for understanding and following the measures of the QA program, and for reporting any quality failures to a Manager or Supervisor in a timely manner.

- 4.7.2 Supervisors and Managers are responsible for ensuring that all laboratory personnel are familiar with the requirements of the Quality Assurance Program and that these requirements are implemented and maintained. It is the responsibility of each Supervisor to ensure that any quality failures are reported to the Project Manager and the Quality Assurance Department immediately.

- 4.7.3 It is the responsibility of the Technical Director to ensure that all laboratory personnel are trained to perform their assigned analyses.

- 4.7.4 The laboratory's approved signatories (designees of the Technical Manager) are identified as follows:  
Laboratory Manager  
Director of Project Management  
Project Managers

Individuals are authorized as project manager report signatories based on meeting the qualifications of project manager job description in the QA Manual as well as completion of the following training:

Quality Assurance Manual  
Data Integrity Training  
PCM Asbestos Reports Training

Individuals are authorized to act as project manager report signatories when these documents have been completed and signed by the individual(s) and referenced managers.

### 5.0 QUALITY ASSURANCE PROGRAM

- 5.1 The Quality Assurance Program (QAP) has been developed to provide a high-quality document that complies with the intent of testing regulations, standards, and established guidelines. The QAP takes into account requirements for special controls, processes, test equipment and skills to attain the required quality and the need for verification of quality by inspection and test. It also provides for the training of personnel to attain required proficiency levels and for regular assessments of the QAP to assure the adequacy of resources and the effectiveness of management controls established to achieve quality. The Quality Manual is maintained in a current condition.
- 5.2 Revisions to this QAP are made and controlled by the QA Manager, Technical Director, and Business Unit Manager in accordance with EETSE Atlanta' quality assurance practices. Such revisions and updates shall be performed as needed to improve the effectiveness of this program. Control of this QA manual is accomplished following the requirements of Section 8.2, "Document Control".

## 5.3 Definitions (Not Alphabetical)

5.3.1 Batch - A group of samples and QC samples that are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents.

5.3.1.1 Preparation Batch - is composed of between 1 and 20 samples of the same matrix and meets the criteria for a batch as described in Section 5.3.1. Preparation batches consist of extractions, digestions, or concentrations. The maximum time between the start of processing of the first and last sample in a preparation batch is 24 hours. A preparation batch must have a spiked sample and a duplicate sample (or matrix spike duplicate).

5.3.1.2 Analytical Batch - is composed of prepared environmental samples (extracts, digestates, or concentrates) or non-prepared environmental samples which are analyzed together as a group. When the batch contains non-prepared samples as a group, the rules for preparation batches must be followed.

5.3.1.2.1 Test categories where samples do not have to be prepared prior to analysis include GRO, VOC, Ion Chromatography, direct injection SVOC, orthophosphorus, turbidity, pH, and Conductivity.

5.3.1.2.2 When soil VOC or GRO samples arrive in ENCORES or in jars, they considered prepared when placed into water or methanol. Rules for preparation batches apply.

5.3.1.2.3 The maximum length of time that an analytical batch can be left open is 24 hours. An analytical batch may have no more than 20 samples of similar matrix.

5.3.1.2.4 Test procedures take precedence over analytical batch considerations. For example, if the test procedure identifies a batch as occurring over a 12 or 24 hour period, then batches may not be left open for the time period stated in Section 5.3.1.2.1.

5.3.1.2.5 Methanol or water VOC or GRO samples prepared in the laboratory from ENCORES or jars cannot be combined into a sequence with samples that have not been prepared by the laboratory so as to create a batch that contains more than 20 samples or runs for longer than 24-hours.

5.3.1.2.6 An analytical batch must include the analysis of a spiked sample and a duplicate sample (or matrix spiked duplicate) every 20 samples in the batch. In addition, internal quality control dictates that a LCS sample is also included in the batch.

5.3.1.2.7 Always analyze the quality control samples at the beginning of the analytical batch. Quality control samples include the MS, MSD, LCS, LCSD, MB, CCB, and CCV.

5.3.1.2.8 Always verify batch completion date in LIMS.

5.3.2 Accuracy - The nearness of a result or the mean (average) of a set of results as compared to the true value. Accuracy is assessed by means of reference samples, laboratory control sample (spikes), matrix spikes, etc, and is measured in percent recovery.

5.3.3 Blank - There are several types of blanks. The various types are defined below.

5.3.3.1 Calibration Blank - specified in some analytical procedures, is an aliquot of analyte free matrix used to establish a zero-concentration instrument response value.

5.3.3.2 Reagent Blank (as defined under AIHA LAP Accreditation) - includes all the reagents using the same procedure as is used for samples.

- 5.3.3.3 Method Blank, referred to as a media blank (defined under AIHA LAP Accreditation) - Blank sampling media and analytical reagents analyzed, when applicable, with each batch of samples, using the same procedure that is used for samples. Typical media includes wipes, filters, and air cartridges. Clients should supply specimens of blank sampling media from the same source lot as was used for collecting the field samples.
- 5.3.3.4 Method Blank (as defined for environmental samples under NELAC or other state accreditations) - an aliquot of analyte-free matrix, usually reagent water or clean sand, to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank is carried through the complete sample preparation and analytical procedure. The method blank is used to document the absence of contamination resulting from the analytical process.
- 5.3.3.4.1 Except for certain conditions listed below, all analytes associated with the blank must have concentrations less than the reporting limit.
- 5.3.3.4.1.1 The reporting limit may be raised above the level of contamination in the method blank and associated samples with documentation of client approval. (Note: This is not acceptable under any AIHA LAP Accreditation Programs.)
- 5.3.3.4.1.2 Sample results are 10 times the concentration of the method blank. The data may be reported with a flag indicating that low level contamination was detected in the method blank. Report data with a "B" qualifier.
- 5.3.3.4.2 Field Blank (Usually associated with environmental samples under NELAC or other state accreditations) - also called an equipment blank. A field blank is an aliquot of analyte-free water brought to the field in sealed containers, transferred to a sample container, and transported back to the laboratory with the samples to be analyzed. The field blank is used to evaluate any possible contamination introduced to the samples during the field collection process.
- 5.3.3.4.3 Trip Blank - an aliquot of analyte-free water which accompanies the empty containers to the field and the collected samples back to the laboratory. The trip blank is an indicator of possible sample contamination originating from site conditions and sample transportation.
- 5.3.4 Initial Calibration Verification (ICV) Standard - An ICV is a standard that has been prepared from a source that is not the same as the source used for the preparation of the calibration curve. A second source represents either, a different lot number of standard purchased from the same vendor, or the same standard purchased from a second vendor. ICV standards are not prepared using the same procedures as samples (e.g., digestions or extractions). The individual test methods describe the preparative procedures and suppliers for these standards. ICV standards are analyzed immediately after a successful calibration curve has been developed. Typically, the ICV standards are prepared so that their concentrations represent a midpoint of the calibration curve.
- 5.3.5 Continuing Calibration Verification (CCV) Standard - A CCV is a standard that has been prepared from the same source as the calibration standards. CCV standards are not prepared using the same procedures as samples are prepared (e.g. digestions/extractions). Individual test methods describe the preparative procedures and suppliers for these standards. CCV standards must be analyzed every 10 samples throughout the analytical batch, and at the beginning and end of the analytical batch.



- 5.3.6 Laboratory Control Sample (LCS) - Typically prepared by spiking an analyte free matrix such as an aliquot of reagent water or analyte-free soil (Work done under AIHA LAP IHLAP accreditation, the LCS/LCSD is prepared by spiking the same media used for sampling. For AIHA LAP ELLAP accreditation, the appropriate blank matrix/media is spiked) with the analyte(s) of interest. The LCS is prepared and analyzed employing the same methodology as the associated samples. The LCS is used to monitor, assess, and control the laboratory's performance of the methods employed for sample preparation and analysis. The LCS must be performed once per analytical batch, extraction batch, or digestion batch. An extraction or digestion batch is defined as twenty or fewer samples of similar matrix analyzed in a 24-hour period using similar preparative and/or extraction techniques. In many cases, a duplicate LCS sample (LCSD) will be analyzed along with the LCS.
- 5.3.7 Deionized Water (DI Water, DIW) - Reagent free water that is prepared by passage through various filters and membranes.
- 5.3.8 Environmental Sample - An environmental sample or field sample is a representative portion of any matrix (aqueous, non-aqueous, mixed waste, etc.) collected from any source for which the determination of the composition of the contamination is requested or required. For the purpose of this procedure, environmental samples are classified as follows:
- 5.3.8.1 Aqueous - Aqueous samples include surface water, ground water, drinking water, or wastewater. Wastewater consists of municipal and industrial influents and effluents.
  - 5.3.8.2 Soils - Soil samples consist of sediments, soils, and sludges.
  - 5.3.8.3 Non-Aqueous Liquids - Non-aqueous liquids consist of solvents, oils, and fuels. These sample types are not miscible with aqueous samples.
  - 5.3.8.4 Non-Soil Solids - Non-soil solids consist of solid waste, precipitate waste, industrial sludges, concrete, wood, paint chips, ash, and wipes.
  - 5.3.8.5 Bioassay - Bioassay samples consist of bio-solids and municipal waste treatment sludges.
  - 5.3.8.6 Air - Air samples consist of filters, absorbent traps, activated carbon, and passive monitors used in the collection of air samples. Additionally, air samples can be collected in SUMMA canisters or Tedlar bags. In these two cases, the sample is the air itself.
- 5.3.9 External Quality Control - Practices that monitor the data quality from sources outside the control of the laboratory (e.g. multi-laboratory performance evaluation samples & external audits).
- 5.3.10 Instrument Detection Limits (IDL) - Minimum concentration limits of an analyte above the instrument noise level that can be detected & quantified with a high degree of confidence (>95%).
- 5.3.11 Internal Quality Control - Those practices implemented internally to monitor the quality of data and which are under the control of the laboratory (i.e. intra-laboratory performance samples, internal audits, single blind samples, etc.)
- 5.3.12 Matrix Spike / Matrix Spike Duplicate (MS/MSD) - An environmental sample to which predetermined quantities of specific analytes are added prior to sample preparation and analysis. Percent recoveries are calculated for each of the spiked analytes to assess the effect of the matrix on analyte recovery. In addition, a calculation of precision is made between the results of the MS/MSD to determine reproducibility of results in a specific matrix. This is measured by either the Relative Percent Difference (RPD) or Percent Relative Standard Deviation (%RSD). MS and MSD samples



are analyzed with each analytical, extraction, or digestion batch of up to 20 samples. MS and MSD precision and accuracy limits are developed from quality control data.

5.3.13 Method Detection Limits (MDL) - The term MDL is defined by the EPA as the minimum concentration of a substance that can be measured and reported, in a specific matrix, with 99% confidence that the measured concentration is distinguishable from method blank results (Note: previous definition was that the measured concentration was greater than zero). Initial MDLs are calculated two ways. First, they are calculated any analyte presence in method blanks as MDL<sub>b</sub> (Blank MDL). If some but not all of the method blanks for an individual analyte give numerical results, the Blank MDL is set equal to the highest result. Second, the MDL is calculated from spiked samples, giving the MDL<sub>s</sub> (Spike MDL). The MDL used will be the higher MDL between the Blank MDL and the Spiked MDL. MDLs are verified quarterly by analyzing two spiked samples. Annual reverification using data from the four quarterly MDL verifications or from using the last 50 or six months' worth of blanks, whichever is greater. The annual reverification is performed within 13 months of the initial MDL. The calculated MDL using the quarterly checks must be within a factor of 0.5 to 2.0 of the initial MDL. If it is, the reverification is complete and the MDL value remains the same until the next reverification. If the calculated MDL is not within a factor of 0.5 to 2.0 of the (initial) MDL study, the initial study must be repeated.

5.3.14 Precision - The agreement of a set of replicate results. Typically, the laboratory analyzes LCS and LCSD or MS and MSD samples and reports the results as RPD or %RSD.

5.3.15 Practical Quantitation Limit (PQL) - is a term that is not used today by regulators. Historically, the PQL is viewed as five times the Method Detection Limit (MDL). Frequently, it is a general term meaning reporting limit.

5.3.16 Qualifiers - A phrase or word group that limits or modifies the meaning. (See section 12.5.4)

5.3.17 RCRA - Resource Conservation Recovery Act

5.3.18 Relative Percent Difference (RPD) - A measure of agreement between two replicate results, expressed as follows:

$$RPD = 100 * \frac{X_1 - X_2}{\bar{X}}$$

where:  $X_1$  and  $X_2$  = the two results

$\bar{X}$  = mean value of the results

5.3.19 Relative Standard Deviation (RSD) - The variance from the mean or true value divided by the mean or true value, expressed as a percentage.

$$\% RSD = 100 * S / \bar{X}$$

where:

$\bar{X}$  = arithmetic mean of the measurements

S = variance

5.3.20 Representativeness - The degree to which data represent a characteristic of a population or set of samples. It is a measurement of both analytical and field sampling precision.

5.3.21 Standard Curve - A curve, which plots known standard concentrations or amounts of an analyte versus the instrument response for the analyte. This curve is used to determine the concentration of the analyte in the unknown samples.

- 5.3.22 Surrogate - Organic compound(s) which is/are similar to analytes of interest in chemical composition, extraction efficiency, and chromatographic retention, but are not normally found in environmental samples. These compounds are spiked into all blanks, standards, samples, and spiked samples prior to analysis. Percent recoveries are calculated for each surrogate to assess the effectiveness of the sample preparation and analysis and any potential matrix effects.
- 5.3.23 TNI - The NELAC Institute
- 5.3.24 AIHA LAP - American Industrial Hygiene Association, Laboratory Accreditation Program
- 5.3.25 Method of Standard Additions - The standard addition technique involves adding known amounts of standard to one or more aliquots of the processed sample solution. This technique compensates for a sample constituent that enhances or depresses the analyte signal, thus producing a different slope from that of the calibration standards. It will not correct for additive interferences that cause a baseline shift.
- 5.3.26 Estimation of Uncertainty - is the parameter associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurement. (See section 12.1 for more information.)
- 5.3.27 Measurand Quantity intended to be measured or analyte concentration. The measurands for methods under AIHA LAP accreditation are available in the SOPs. (Sec 12.1 for more info.)
- 5.3.28 Interim Limits - are used to establish the level of uncertainty when limits are not available until enough laboratory data has been compiled to establish historical limits. Interim limits may be derived from published methods, those limits within similar analysis, LCS recovery ranges, or based on reasonable expectations from laboratory experience.
- 5.3.29 Lower Limit Of Quantitation (LLOQ) - As defined in EPA's SW-846 Compendium, it is the lowest point of quantitation, or in most cases, the lowest point in the calibration curve, which is ideally less than or equal to the desired regulatory action levels based on the stated project requirements.
- 5.3.30 Minimum Level - is a term from 40CFR136 that refers to either the sample concentration equivalent to the lowest calibration point in a method or a multiple of the MDL, whichever is higher. Minimum Levels may be obtained in several ways: they may be published in a method; they may be based on the lowest acceptable calibration point used; or they may be calculated by multiplying the MDL (from the method or as determined by the laboratory) by a factor of 3.
- 5.3.31 BRL (Below Reporting Limit) - The acronym BRL is used to report the PQL in an easy to understand manner. On EETSE Atlanta analytical reports, BRL is next to the Reporting Limit. Together, BRL and the Reporting Limit mean that if the analyte were present in the sample, it would be below the reporting limit. It would be below the range of specified limits of precision and accuracy. In most cases, this corresponds to the lowest point on the calibration curve. The relationship between the MDL and the PQL (Reporting Limit) is that the MDL is the point at which the analyte is detected but the PQL is the point at which the quantitation is considered to be of known precision and accuracy. Concentrations between the MDL and PQL are estimated values.
- 5.3.32 Risk - That which makes achieving an objective uncertain (or the effect of uncertainty in objectives)
- 5.3.33 Risk Assessment - Comparison of the risk likelihood and impact to the severity of the risk's impact.
- 5.3.34 Risk Management - is the identification, assessment and prioritization of risks followed by analysis to minimize, monitor, and control the impact to maximize the realization of opportunities.
- 5.3.35 Opportunities - Events with potential positive outcomes for the organization or company.

## 5.4 Data Quality Objectives for Environmental Testing

- 5.4.1 Precision. The laboratory objective for precision is to meet the performance criteria demonstrated for all analytical methods as published by the USEPA under SW-846 and 40 CFR Part 136. These criteria are met on similar samples and similar sample matrices. Precision is documented based on replicate analysis, usually duplicate or matrix spike duplicate samples.
- 5.4.2 Accuracy. The laboratory objective for accuracy is to meet the performance criteria demonstrated for these analytical methods as published by the USEPA under SW-846 and 40 CFR Part 136. These criteria are met on similar samples and similar sample matrices. Accuracy is documented based on recovery data; usually matrix spike samples.
- 5.4.3 Representativeness. The laboratory objective for representativeness is to provide data which is representative of the sampled medium. The representativeness of the analytical data is a function of the procedures used in processing the samples.
- 5.4.4 Comparability. The comparability objective is to provide analytical data for which the accuracy, precision, representativeness, and reporting limit statistics are similar in quality to data generated by other laboratories for similar samples and to data compiled by EETSE Atlanta over time. The comparability objective may be documented by any of the following:
  - 5.4.4.1 Inter-laboratory studies carried out by regulatory agencies.
  - 5.4.4.2 Inter-laboratory studies initiated for specific projects or contracts.
  - 5.4.4.3 Comparison of periodically generated statements of accuracy, precision, and reporting limits to those of other laboratories.
  - 5.4.4.4 Through approval from the US EPA or other regulatory agencies for any procedure to which significant modifications have been made.
- 5.4.5 Completeness. The completeness objective for data can be set for a particular project and is expressed as the ratio of the valid data to the total data over the course of the project. The comparison between the amount of valid, or usable, data you originally planned to collect, versus how much you collected. [Appendix XI Footnote 37](#) (from EPA, it is usually described as a measure of the amount of available data from a statistical system compared to the amount that was expected to be obtained.)

## 5.5 Criteria for Quality Indicators

- 5.5.1 The precision and accuracy acceptability limits for analyses performed at EETSE Atlanta are located in the LIMS and posted on the portal server. The limits in the tables are either laboratory-generated or derived from USEPA methods.
- 5.5.2 [Table 5-3](#) defines the criteria for data acceptability. Data may be accepted when QC falls outside these limits if probable cause can be attributed to the matrix, and laboratory control samples (LCS) show that the method is in control. Deviations are documented in the final report to the client. In instances where an LCS limit is not available, a limit of [30-170%](#) recovery may be used until in-house limits are available. (Note: Sometimes an alternative default limit may be found in a published method and substituted.) In some cases, lower default limits may be set with approval from the Quality Assurance Manager and Technical Director. The acceptable range of some compounds may be broader, based on prior knowledge of the analyte (e.g., phenols in EPA Method 8270C).

## 5.5.3 Statistically Derived Limits

- 5.5.3.1 Selected methods and programs require statistically derived accuracy and precision limits. EETSE Atlanta routinely uses statistically derived limits to evaluate method performance and to determine when corrective action is appropriate.
- 5.5.3.2 The laboratory periodically updates the limits as stated, but no less than annually. Analysts must use the current limits as found in LIMS.
- 5.5.3.3 The QA Manager maintains an archive of all limits used within the laboratory. If a method defines the QC limits, the method limits are used. If a method requires the generation of historical limits, they can be derived from data in the LIMS database or by viewing archives.

## 5.5.4 Development of new QC limits.

- 5.5.4.1 The QA Manager determines limits using the in-house LIMS system. This is accomplished by the statistical analysis of data for each test method where the method specifies that internal limits are developed.
- 5.5.4.2 Reviewed data types within the methods include LCS, LCSD, MS, MSD, and surrogates in samples, control samples, and spikes. It is recommended that surrogates are evaluated on a separate basis for samples, LCS, and MS since recovery limits will be wider for client samples than for laboratory control samples.
- 5.5.4.3 QC limits are updated in LIMS through the Quality Control Section. To change limits, activate the tab called "control charting". Enter the desired test code, analyte, and sample type. Enter the number of desired data points, and then "get data".
- 5.5.4.4 Ideally, 20 or more data points chosen. For tests which data is generated more frequently, e.g. volatile surrogate recoveries in samples, usually, 40 data points or more are used.
  - 5.5.4.4.1 For tests in which there are less than 20 data points, interim limits specified by the method are used unless approved by the QA Manager. If interim limits are not specified by the method, the QA Manager and Technical Director must choose interim limits that represent an estimation of the current laboratory performance. The data in the tables should be footnoted accordingly.
  - 5.5.4.4.2 For tests in which data is generated more frequently, e.g. volatile surrogate recoveries in samples, usually, 40 data points or more are used. The LIMS will pick data points in historical order beginning with the date the action is being performed. The LIMS will compile as many data points are available if the requested number exceeds the number of points in LIMS The LIMS will pick data points in historical order beginning with the date the action is being performed. If the requested number exceeds the number of points in LIMS, then LIMS will compile as many data points as are available.
- 5.5.4.5 Data should be observed for outliers, and these samples de-selected using the "radio buttons". Once the data is reviewed, limits can be recalculated by choosing the "Re Calc Stats" tab. Outlying data points are determined by the following two methods:
  - 5.5.4.5.1 Grubbs Test - is a statistical test used to detect outliers in a univariate data set assumed to come from a normally distributed population.
  - 5.5.4.5.2 Manual observation of data set to verify that the data points selected are within the calculated control limits. If they are not, the data points must be "de-selected" and the limits recalculated until the data is within the calculated limits.

5.5.4.6 The lower limit determined from historical data shall not be set to a value less than 10. That is, if the calculated lower limit is  $< 10$ , a default value of 10 will be used for the lower limit unless specified by the published method.

5.5.4.7 When the data set is acceptable, choose the “Preview” tab to view data in a page format.

5.5.4.8 Through the “Windows” application, print the data in “Adobe” format by selection of the proper network printer. The file should be saved in one of the following folders depending on which QC type:

TestMethod\_Matrix\_LCS\_LCSD\_REC  
 TestMethod\_Matrix\_LCS\_LCSD\_RPD  
 TestMethod\_Matrix\_MSD\_REC  
 TestMethod\_Matrix\_MSD\_RPD  
 TestMethod\_Matrix\_SURR\_REC

### 5.5.5 Review of revised QC limits

5.5.5.1 After data has been revised for each test method and matrix, results are discussed with the appropriate department managers and Technical Director, if there are concerns about the new limits. The updated limits are then entered into the laboratory LIMS system.

5.5.5.2 New limits are calculated or reviewed every one to two years by the QA Manager with updates as necessary.

### 5.6 External Quality Assurance Objectives

5.6.1 External Quality Control is the process of employing outside sources to monitor the quality of the data produced by the laboratory. Included in the external quality control program are the analysis of performance evaluation samples and participation in performance evaluation audits.

5.6.1.1 EETSE Atlanta, Inc. analyzes Proficiency Test (PT) samples for each PT field of testing as defined in The NELAC Institute (TNI) and AIHA LAP Fields of Test tables according to matrix type, analyte, and regulatory or environmental program. Samples are obtained from NELAP-designated PTOB / PTPA-approved PT providers (such as Environmental Resource Associates) for NELAP compliance or directly from AIHA LAP to meet their program requirements. The results of the analyses are submitted to the PT Provider for scoring. Study reports are maintained for a minimum of five years on the portal server. The analyses of PT studies are conducted in accordance with all TNI or AIHA LAP. Where required (as with gravimetric analyses for AIHA LAP), an internal PT will be used.

5.6.1.1.1 EETSE Atlanta participates in a minimum of two single-blind, single-concentration PT studies per year for each PT field of testing for which it is accredited. Studies are performed at least 15 calendar days apart. Successful completion of two of the last three proficiency rounds for a given PT field of testing must occur in order to maintain accreditation.

5.6.1.1.2 Blind water or soil PT samples contain amounts of specific constituents that are unknown to laboratory personnel. Upon arrival, PT samples are logged into the Laboratory Information Management System (LIMS) and tracked as routine environmental samples. PT samples provided by the vendor may be ‘whole’ samples or may have been provided in a concentrated form. PT vendor instructions are followed and dilutions performed on the concentrated vials to make them the ‘whole’ sample to be tested. Routine procedures for dilutions and analysis are followed per method specific SOPs. The laboratory results must be completed and reported within the required turnaround time.



- 5.6.1.1.3 EETSE Atlanta, Inc. maintains copies of all written, printed, and electronic records, including, but not limited to bench sheets, instrument chromatograms or printouts, data calculations, and data reports resulting from the analysis of any PT sample. These records are maintained for five years or for as long as required by the applicable regulatory program, whichever is greater. These records include a copy of the PT study report forms used to report PT results. All laboratory records are available to assessors of the Primary Accrediting Authority during on-site audits.
- 5.6.1.1.4 Whenever a study is failed, EETSE Atlanta determines the cause for the failure and takes the necessary corrective actions. The investigation and action taken are documented into QA records and provided, if required, to the Primary Accrediting Authority.
- 5.6.1.2 Performance evaluation samples are also obtained from the following list of suppliers.
- 5.6.1.2.1 ELPAT. This proficiency testing program is administered by the American Industrial Hygiene Association-Laboratory Accreditation Program (AIHA LAP). Once a quarter, the laboratory receives a set of proficiency samples from Research Triangle Institute for the analysis of lead content. The matrices are soils, wipes, and/or paint chips.
- 5.6.1.2.2 PAT. This proficiency testing program is administered by the American Industrial Hygiene Association-Laboratory Accreditation Program (AIHA LAP). Once a quarter, the laboratory receives a set of proficiency samples to be analyzed for metals, asbestos fibers, This program is required as part of the laboratory's certification to perform analyses on samples that measure indoor air quality.
- 5.6.1.2.3 EMPAT. This proficiency testing program is administered by the American Industrial Hygiene Association-Laboratory Accreditation Program (AIHA LAP). EMPAT fungal proficiency samples are available for both the 'Direct Examination'. Once a quarter, the laboratory receives notification that the Fungal Direct Examination Proficiency Testing Program has opened on the AIHA LAP website. The lab has access to the portal for 24 hours a day for 7 days at which time the study closes. This program requires the identification of selected slides within a set amount of time.
- 5.6.1.2.4 North Carolina Department of Environmental, Health and Natural Resources. Once a year the laboratory receives performance samples for certification by North Carolina for all analyses not already submitted under other programs. These samples are critical for the continuation of certification by the state of North Carolina. To renew certification each year, the lab must submit acceptable PT sample results to the NC WW/GW LC Program for each parameter, analyte, technology and matrix (where a method is matrix-specific) by October 31. A laboratory that fails a PT sample for a parameter method technology must take steps to identify the root cause of the failure, take corrective action, report the corrective action taken to NCDENR, and participate in a second PT study meeting the criteria listed previously in this policy. The corrective action response must include the laboratory's root cause analysis and a copy of any objective evidence (e.g., calibration curves, revised procedures, records, training records, standard operating procedures, etc.) to indicate that the corrective actions have been implemented /completed. The results of the remedial PT must be received in this office within 60 days from the date the failed results are issued by the accredited proficiency testing provider. A laboratory failing the second (or remedial) PT study may be decertified for that parameter method technology (not necessarily for all technologies for that parameter).



For multi-analyte parameters (e.g., organic analyses), when greater than 80% of analytes are acceptable, but one or more individual analytes are graded unacceptable, acceptable performance has been demonstrated for the parameter method technology. The laboratory must, however, analyze a remedial PT for the individual analytes that were graded unacceptable. When a remedial PT is graded unacceptable for an individual analyte (constituting a second unacceptable result), the laboratory must qualify data for those individual analytes as “estimated” (whether detected or not) until acceptable results are obtained on two consecutive remedial PTs for the analyte in question.

### 5.6.1.3 Performance Audits

5.6.1.3.1 In order to maintain certification in many states, to comply with commercial contracts, and to satisfy many agency requirements, EETSE Atlanta, Inc. must undergo initial and ongoing audits performed by external auditors. These audits may take the form of technical and/or evidentiary audits. Every section of the laboratory, both analytical and clerical, should be ready at all times to participate in these audits.

5.6.1.3.2 In the event that adverse findings or deficiencies are discovered, or observations and/or recommendations are made during an audit, QA and laboratory management shall review the comments and submit a response, including corrective actions, to the audit report.

### 5.6.1.4 State Audits

5.6.1.4.1 State Audits are performed in accordance with each individual state’s certification program. These audits are generally performed to determine the laboratory’s suitability to perform environmental analyses according to the parameters dictated by that state.

### 5.6.1.5 Commercial Audits

5.6.1.5.1 Audits performed by commercial clients may be scheduled on a pre-award basis for a contract. Once the contract is awarded, audits may be scheduled at the request of the client or at a pre-determined frequency. The client, as well as professional audit teams, may perform audits required by commercial clients.

## 5.7 Internal Quality Control

5.7.1 The internal quality control program serves two primary functions. One function is to monitor the reliability of the data (e.g., accuracy and precision). The other function is to control and maintain the quality of the data (e.g., the use of ACS grade reagents, traceable standards, etc.).

5.7.2 The following sections outline the specific actions and procedures employed to monitor the process for producing and reporting quality data that is consistent with the Quality Control Program. Processes such as, but not limited to, **validity of results**, verification of operator competence, recovery of known spikes, analysis of reagent blanks, calibration with traceable standards, analysis of duplicates, and maintenance of quality control charts must be employed and continually monitored. The laboratory may also adopt additional quality assurance procedures; however, the minimum requirements are discussed below. The QA Manager and Technical Director, under restrictions by the methodology and in conjunction with the appropriate laboratory management staff, shall determine which requirements shall be implemented for each section.

5.7.3 Training & Certification of Operator Competence. Quality Control begins with the establishment of basic laboratory techniques and skills. It is imperative that analysts receive proper training before performing independent laboratory analyses. Each analyst must demonstrate proficiency of laboratory techniques and skills. Records to that effect are kept in the employee’s personal training files.

- 5.7.4 Documentation. Regardless of which analytical procedures are used in the laboratory, the methodologies employed shall be carefully documented.
- 5.7.4.1 Standard Operating Procedures (SOPs) and approved methods may be periodically modified, updated, or replaced in their entirety due to advances in technology, regulatory protocols, or at the discretion of laboratory management. All proposed changes, however, are reviewed by the Technical Director to ensure compliance with all regulatory protocols.
- 5.7.4.2 If a client requests a change of procedure, the change must be pre-approved by the laboratory prior to use. The change must be documented in writing and kept on file as part of the laboratory project records.
- 5.7.4.3 If a method is modified such that it no longer complies with the provisions set forth by the accrediting agencies, the client will be informed.
- 5.7.4.4 Documentation of analytical procedures for generating laboratory data shall be clear, concise, adequately referenced, and reflect the actual steps employed by the analyst.
- 5.7.5 Standard Operating Procedures (SOP). Methodologies employed in the laboratory are documented in SOPs. (Table 5-3 shows a Summary of Calibration and QC Procedures for Various Tests.) See Chapter 8 gives detailed information on SOPs.
- 5.7.6 Initial Calibration Verification (ICV) Standard. Individual component recovery of the ICV standard is calculated using the following equation:
- $$\text{ICV Standard Percent Recovery} = \frac{A}{T} \times 100$$
- where:  
 A = concentration measured  
 T = true value of the spiking concentration
- 5.7.6.1 The ICV must be made from a different source than the calibration curve standards.
- 5.7.6.2 The acceptable recovery limits for the ICV standards vary based on the individual procedure and are specified in Table 5-3.
- 5.7.6.3 If the recoveries of any of the ICV standards are not within the limits specified in Table 5-3, the test method may not be performed. The analyst must follow the out-of-control procedures discussed in Section 5.8 before initiating any analyses.
- 5.7.7 Continuing Calibration Verification (CCV) Standard. Individual component recovery of the CCV standard is calculated using the following equation:
- $$\text{CCV Standard Percent Recovery} = \frac{A}{T} \times 100$$
- where:  
 A = concentration measured  
 T = true value of the spiking concentration
- 5.7.7.1 The acceptable recovery limits for the CCV standards are procedure dependent and are specified in Table 5-3.

5.7.7.2 If the recoveries of any of the CCV standards are not within the limits specified in Table 5-3, the testing must be discontinued. The analyst must follow the out-of-control procedures discussed in Section 5.8 before continuing any analyses.

### 5.7.8 The Laboratory Control Sample (LCS)

5.7.8.1 The individual test methods describe the preparative procedures and suppliers for the LCS & LCSD standards. The LCS & LCSD samples are prepared in either reagent grade water or sand in accordance with the procedural steps followed for the preparation of a matrix spike sample.

5.7.8.2 Individual component recovery of the LCS(D) is calculated using the following equation:

$$\text{LCS (LCSD) Spike Percent Recovery} = \frac{A}{T} \times 100$$

where:

A = concentration measured

T = true value of the spiking concentration

5.7.8.3 Precision between the LCS and LCSD recoveries is calculated using the following equation:

$$\% \text{ RPD} = \frac{\text{Difference between LCS and LCSD recoveries}}{\text{Average of LCS and LCSD recoveries}} \times 100$$

5.7.8.4 The acceptable recovery limits for the LCS standards vary based upon the individual procedure and are specified in LIMS test codes.

5.7.8.5 If recoveries of any of the LCS standards are not within the limits specified in the table, the testing must be stopped. If the precision between the two recoveries is not within the limits specified in the table, the testing must be stopped. The analyst must follow the out-of-control procedures discussed in Section 5.8 prior to continuing any analyses.

5.7.9 Matrix spike (MS) and matrix spike duplicate (MSD). Individual component recovery of the matrix spike is calculated using the following equation:

$$\text{Matrix Spike Percent Recovery} = \frac{(A - B)}{T} \times 100$$

where:

A = concentration measured after spiking

B = background concentration

T = true value of the spiking concentration

5.7.9.1 MS and MSD sample recovery limits are used to determine matrix effects on the recovery target analytes. The acceptable recovery limits for the MS and MSD standards are indicated in [LIMS test codes](#).

5.7.9.2 It is the discretion of the department manager to have a batch re-processed or re-analyzed after assessment of the matrix spike recovery values and other batch QC data. The analyst must follow the out-of-control procedures discussed in Section 5.8 prior to continuing any analyses.

5.7.9.3 In the event that insufficient sample is provided for MS/ MSD analysis, the narrative of the final report must be amended to indicate lack of sample for analysis of MS and / or MSD.

5.7.10 An Initial Demonstration of Capability (IDOC) study is performed to establish the ability of an analyst and/or analytical system to generate acceptable precision and accuracy data. An IDOC study is performed on each certified method and matrix analyzed in the laboratory where applicable. Samples prepared for the IDOC studies are made from a second source independent of the standard source used for the calibration determination. A second source standard may be a standard purchased from the same manufacturer but a different lot or batch. Four LCS's are prepared and analyzed. To establish the ability to generate acceptable accuracy and precision, the analyst must perform the following operations:

- 5.7.10.1 Because of the nature of several test methods, IDOCs cannot be performed. These tests represent methods where samples of known concentrations cannot be prepared in the laboratory. Specific requirements for these test methods are described in Table 5-1\*\*\*.
- 5.7.10.2 Calculate the average recovery (x) in µg/L, and the standard deviation of the recovery(s) in µg/L, for each analyte using the four results. Demonstration of Capability must be updated and documented annually or more frequently if required by method with a Continuing Demonstration of Capability (CDOC). Other options for CDOC include the use of successfully passed third party Proficiency Test (PT) studies and Method Detection Limit studies that meet recovery and reporting limit criteria. (See Table 5-1)
- 5.7.10.3 The Method Performance Section of the individual SOP provides laboratory recovery and precision data for the method. Similar results from spiked water should be expected. Results are considered comparable if the calculated standard deviation of the recovery does not exceed the single laboratory RSD or 10% (20% for some organic analytes), whichever is greater and the mean recovery lies within the interval indicated by the test method, or  $X \pm 15\%$ , whichever is greater. Specific requirements for each NELAP certified test method as well as those required by AIHA LAP are described in Table 5-1\*\*\*.

Table 5-1 Demonstration of Capability Acceptance Criteria

| Certified Method                   | DOC Requirement                               | Control Limits/ Acceptance Criteria*                             |
|------------------------------------|-----------------------------------------------|------------------------------------------------------------------|
| AIHA LAP METHODS                   |                                               |                                                                  |
| SW3050B / N7082 (Lead Paint)       | IDOC: 4 sets of 5 Ref<br>CDOC: Batch QC or PT | 80-120%Rec<br>LCS Control Limits, MDLs or PT Acceptance Criteria |
| SW3050B / 7000B (Lead in Soil)     | IDOC: 4 sets of 5 Ref<br>CDOC: Batch QC or PT | 80-120%Rec<br>LCS Control Limits, MDLs or PT Acceptance Criteria |
| N7082 (Lead in Dust Wipe)          | IDOC: 4 sets of 5 Ref<br>CDOC: Batch QC or PT | 80-120%Rec<br>LCS Control Limits, MDLs or PT Acceptance Criteria |
| N7303 (Lead in Air)                | IDOC: 4 sets of 5 Ref<br>CDOC: Batch QC or PT | 80-120%Rec<br>LCS Control Limits, MDLs or PT Acceptance Criteria |
| N7400 (Asbestos PCM)               | PT Samples                                    | PT Acceptance Criteria                                           |
| Fungal Air Direct Exam (Micro)     | PT Samples                                    | PT Acceptance Criteria                                           |
| Fungal Bulk Direct Exam (Micro)    | PT Samples                                    | PT Acceptance Criteria                                           |
| Fungal Surface Direct Exam (Micro) | PT Samples                                    | PT Acceptance Criteria                                           |
| SM2120B Color                      | 4 LCS or PT                                   | LCS Control Limits or PT acceptance Criteria                     |
| SM2120F Color ADMI                 | 4 LCS or PT                                   | LCS Control Limits, MDLs or PT acceptance Criteria               |
| E100.2                             | Prep, LCS or PT                               | Meet Grid QC, Calib of TEM, EDXA, Camera                         |
| E120.1 Conductivity                | 4 LCS or PT                                   | LCS Control Limits or PT acceptance Criteria                     |
| SM4500H <sup>+</sup> B-2011 pH     | 4 LCS or PT                                   | LCS Control Limits or PT acceptance Criteria                     |
| SM2540C TDS                        | 4 LCS or PT                                   | PT acceptance Criteria                                           |
| SM2540D TSS                        | 4 LCS or PT                                   | LCS Control Limits or PT acceptance Criteria                     |

| Certified Method                          | DOC Requirement        | Control Limits/ Acceptance Criteria*               |
|-------------------------------------------|------------------------|----------------------------------------------------|
| SM2540B TS                                | 4 LCS or PT            | LCS Control Limits or PT acceptance Criteria       |
| E160.4 VS                                 | PT                     | PT acceptance Criteria                             |
| SM2540F Settleable Solids                 | PT                     | PT acceptance Criteria                             |
| E1664B Oil and Grease TPH                 | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E180.1 Turbidity                          | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E200.7 ICP EETSE Atlanta Metals           | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E200.8 ICP MS Metals                      | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E245.1 Mercury                            | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E300 Anions by IC                         | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM2310B Acidity                           | 4 LCS or PT            | LCS Control Limits or PT acceptance Criteria       |
| SM2320B Alkalinity                        | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM4500Cl G-2011 Residual Chlorine         | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM4500CN G-2016 Amenable Cyanide          | 4 LCS                  | LCS Control Limits                                 |
| SM4500CN E-2016 Total Cyanide             | 4 LCS or PT            | LCS Control Limits or PT acceptance Criteria       |
| E350.1 Ammonia (as N)                     | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| E351.2 TKN                                | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| E353.2 Nitrate (as N)                     | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| E353.2 Nitrate Nitrite (as N)             | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| NECi N07-0003 Nitrate-Nitrite (DA)        | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| E353.2 Nitrite (as N)                     | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM4500O H-2016 Dissolved Oxygen           | 4 LCS                  | LCS Control Limits                                 |
| E365.1 Ortho Phosphorus                   | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| E365.1 Total Phosphorus                   | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM4500S2 F-2011 Sulfide                   | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM4500SO3 B-2011 Sulfite                  | 4 LCS or PT            | RSD Limit $\leq$ RPD Limits                        |
| SM5210B BOD                               | 4 LCS or PT            | LCS Control Limits or PT acceptance Criteria       |
| E410.4 COD                                | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM5310B TOC                               | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| E420.1 Total Phenolics                    | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E420.4 Total Phenolics                    | 4 LCS or PT; LCR / MDL | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM5540C MBAS Surfactants                  | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E610 PAHs                                 | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E615 Herbicides                           | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E624.1 VOCs                               | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| E625.1 SVOCs                              | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| FL-PRO                                    | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| PMOIST                                    | 4 LCS or PT            | Demonstration using Real World Samples             |
| RSK-175 Dissolved Methane, Ethane, Ethene | 4 LCS                  | MDLs or LCS Control Limits                         |
| SM10200H Chlorophyll                      | 4 LCS                  | LCS Control Limits                                 |
| SM2340B Hardness                          | 4 LCS or PT            | LCS Control Limits or PT acceptance Criteria       |
| SM3500Cr B Hexavalent Chromium            | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |
| SM3500Fe B Ferrous Iron                   | 4 LCS or PT            | LCS Control Limits, MDLs or PT acceptance Criteria |



| Certified Method                     | DOC Requirement                    | Control Limits/ Acceptance Criteria*               |
|--------------------------------------|------------------------------------|----------------------------------------------------|
| SM5210B CBOD                         | 4 LCS or PT                        | LCS Control Limits or PT acceptance Criteria       |
| SM9222B Total Coliforms              | PT                                 | PT acceptance Criteria                             |
| SM9222D Fecal Coliforms              | PT                                 | PT acceptance Criteria                             |
| SM9223B E.Coli / Total Coliforms     | PT                                 | PT acceptance Criteria                             |
| SW1010 Flash Point                   | 4 LCS or PT                        | LCS Control Limits or PT acceptance Criteria       |
| SW1030                               | DUP                                | Demonstration using Real World Samples             |
| SW1311 TCLP & 1312 SPLP              | SOP Signoff/EETSE Atlanta Training | N/A                                                |
| SW6010 ICP EETSE Atlanta Metals      | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW6020 ICP MS Metals                 | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW7196 Hexavalent Chromium           | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW7470 Mercury in Water              | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW7471 Mercury in Soils              | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW7473 Mercury in Soils              | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8011 EDB DBCP                      | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8015 DAI                           | 4 LCS                              | LCS Control Limits                                 |
| SW8015 DRO or GRO                    | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8081 Pesticides                    | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8082 PCBs                          | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8151 Herbicides                    | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8260 Oxygenates                    | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8260 VOCs                          | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8270 SVOCs                         | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8310 PAHs                          | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW8315 Formaldehyde and Acetaldehyde | 4 LCS                              | MDLs or LCS Control Limits                         |
| SW9010 9014 Cyanide                  | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW9030 9034 Sulfide                  | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW9040 pH in Water                   | 4 LCS or PT                        | LCS Control Limits or PT acceptance Criteria       |
| SW9045 pH in Soil                    | 4 LCS or PT                        | LCS Control Limits or PT acceptance Criteria       |
| SW9050 Conductivity                  | 4 LCS or PT                        | LCS Control Limits or PT acceptance Criteria       |
| SW9056 Anions by IC                  | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW9060 TOC                           | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW9065 Total Phenolics               | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW9070 Oil and Grease TPH in Water   | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW9071 Oil and Grease TPH in Soils   | 4 LCS or PT                        | LCS Control Limits, MDLs or PT acceptance Criteria |
| SW9095 Free Liquids by Paint Filter  | SOP Sign-Off Only                  | Demonstration using Real World Samples             |
| TO-14A, TO-15                        | 4 LCS                              | MDL or LCS Control Limits                          |

5.7.10.4 The large number of analytes in multi-element analyses presents a substantial probability that one or more will fail at least one of the acceptance criteria when all analytes of a given method are determined. Should this occur, re-analyze only the failed analytes, following the procedures discussed in this section.



5.7.10.5 When one or more of the analytes tested fails at least one of the acceptance criteria, the analyst must proceed according to the out-of-control procedures discussed in Section 5.8.

5.7.10.6 Due to the nature of several test methods, IDOCs cannot be performed. These tests represent methods where samples of known concentrations cannot be prepared in the laboratory. Tests that are included in this category are EPA 110.2, 160.3, 160.4, 160.5, 150.1, 9040, 9045, 1010, SM 2340B, SM2340G, SM9223, and SM9222. To complete IDOCs for these tests, the analyst(s) must satisfactorily pass available PE samples for all appropriate matrices.

5.7.10.7 Analyst Demonstration of Capability and training includes the following:

- Quality Assurance Manual Training (annually)
- Data Integrity (Legal & Ethical) Training (annually)
- SOP Training (initially and as updated)
- ICNs associated with the SOPs (initially and as updated)
- Demonstration of Capability (program specific)
- Procedure and Checklist Training (initially and as updated)

Individuals are authorized to perform analysis when these documents have been completed and signed by the individual(s) and referenced managers.

5.7.10.8 AIHA LAP Training Requirements

AIHA LAP Technician/Analyst Training Requirements. All technicians and analysts must complete training and demonstrate proficiency prior to analysis of any ELLAP or IHLAP program samples. The laboratory documents the competence requirements for each function influencing laboratory activities, including requirements for education, qualification, training, technical knowledge, skills and experience using the following:

- Resumes for the determination of education and previous experience
- Standard Operating Procedures (SOPs) and other training verified with sign-offs (QA Manual, Data Integrity, Health & Safety, general procedure training, etc.)
- Proficiency Testing results
- Routine Quality Control performance
- Frequency of Corrective Action Reports pertaining to analyst
- Observations from management
- Internal audit assessments

The training and proficiency demonstrations must meet the requirements specified in the AIHA LAP LQAP Policy Document, Modules 2A, 2B and 2C and are described in Section 1.2 and 1.3 below.

5.7.10.8.1 ELLAP Specific Technician/Analyst Training Requirements:

5.7.10.8.1.1 Initial demonstration of capability.

Each technician/analyst must complete at least 20 days work/training in the prep and / or metals analysis lab using technologies/instrumentation similar to that to be used for ELLAP samples under the direct supervision of an ELLAP trained tech / analyst prior to unsupervised prep / analysis of ELLAP regulated client samples.

Each analyst/technician must read, understand & agree to follow the laboratory SOP and document using the SOP Acknowledgement sign-off form. Each technician / analyst must prep and/or analyze as appropriate at least 2 blind reference material test samples. These samples may be AIHA LAP provided PT samples or laboratory prepared Certified Reference Material of the appropriate

## Environment Testing

matrix, i.e. soil, paint, wipe (spiked with bag house dust) or air filter. Results must fall within the PT acceptance range or laboratory LCS range as appropriate.

Each technician/analyst must complete a minimum of 4 independent test runs of sample preparation/analysis prior to prepping/analyzing actual samples. This test is performed through the digestion/analysis of four separate groups of 5 replicate, matrix specific Certified Reference Material samples, with each group separated by at least one day. To be deemed acceptable per ELLAP requirements, 75% of the replicates in each group must recover within 90-110% of the true value. Any individual group that fails to meet the ELLAP criteria must be repeated in its entirety (all 5 replicates repeated).

Once all requirements in 5.7.10.8.1.1 have been met, the technician/analyst will be approved to begin unsupervised prep/analysis of client samples. Documentation of approval to begin work is defined as the date signed by the Technical Director (or designee) on the Demonstration of Capability Certification form.

5.7.10.8.1.2 Continuing Demonstration of Capability (CDOC). Each technician/analyst must demonstrate continued capability at least every 6 months through the analysis of AIHA LAP provided PT samples or in house laboratory QC samples, i.e. LCS samples. Results must fall within the AIHA LAP PT acceptance criteria or Policy Module 2C, Table 2C-1 LCS control limits per samples used.

5.7.10.8.1.3 All IDOC and CDOC documentation for ELLAP related procedures is maintained and available for review for at least 5 years.

### 5.7.10.8.2 IHLAP Chemistry Specific Technician/Analyst Training Requirements:

#### 5.7.10.8.2.1 Initial demonstration of capability.

Each technician/analyst must complete at least 20 days of work/training in the prep and/or metals analysis lab using technologies/instrumentation similar to that used for IH samples under the direct supervision of an IH trained technician/analyst prior to unsupervised prep and/or analysis of IH regulated client samples. Each analyst/technician must read, understand and agree to follow the laboratory SOP as documented using the SOP Acknowledgement sign-off form. Each technician / analyst must prep and/or analyze as appropriate at least 2 blind reference material samples (concentration unknown to the technician/analyst). These samples may be AIHA LAP provided PT samples or laboratory prepared Certified Reference Material added to the method specific media used for client samples. Results must fall within the PT acceptance range or laboratory LCS range as appropriate. Once all requirements in 5.7.10.8.2.1 have been met, the technician/analyst will be approved to begin unsupervised prep/analysis of client samples. Documentation of formal approval to begin work is defined as the date signed by the Technical Director on the Demonstration of Capability Certification form.

5.7.10.8.2.2 Continuing Demonstration of Capability (CDOC). Each technician/analyst must demonstrate continued proficiency at least every 6 months through the analysis of AIHA LAP provided PT samples or in house laboratory QC samples, i.e. LCS samples. Results must fall within the AIHA LAP PT acceptance criteria or laboratory established LCS control limits as appropriate. CDOCs are documented via AIHA LAP PT reports or LIMS LCS data as appropriate.

5.7.10.8.2.3 All IDOC and CDOC documentation for IHLAP related procedures is maintained and available for review for at least five (5) years.

5.7.10.8.3 IHLAP Asbestos by PCM Specific Technician/Analyst Training Requirements:

5.7.10.8.3.1 All PCM technicians/analysts must complete a NIOSH 582 equivalent training course and successfully pass the course examination during their training period and prior to beginning unsupervised work on client samples.

5.7.10.8.3.2 Initial demonstration of capability.

Each technician/analyst must complete at least 20 days of work/training in the PCM analysis lab using technologies/instrumentation similar to that to be used for IH/PCM samples under the direct supervision of an IH/PCM trained technician / analyst prior to unsupervised prep and/or analysis of IH/PCM regulated client samples. Each analyst/technician must read, understand and agree to follow the laboratory SOP as documented using the SOP Acknowledgement sign-off form.

Each technician/analyst must prep and/or analyze as appropriate at least 2 blind reference material test samples (concentration unknown to the technician/analyst). These samples may be an AIHA LAP provided PT samples or laboratory prepared Reference Slides. Results must fall within the PT acceptance range or laboratory reference slide counting acceptance ranges as appropriate.

Once all requirements in 5.7.10.8.3.2 have been met, the technician/analyst will be approved to begin unsupervised prep/analysis of client samples. Documentation of formal approval to begin work is defined as the date signed by the Technical Director on the Demonstration of Capability Certification form.

5.7.10.8.3.3 Continuing Demonstration of Capability (CDOC).

Each technician/analyst must demonstrate continued proficiency at least every 6 months through the analysis of AIHA LAP provided PT samples or laboratory prepared Reference Slides. Results must fall within the AIHA LAP PT acceptance criteria or laboratory reference slide counting acceptance ranges as appropriate. CDOCs are documented via AIHA LAP PT reports or in the QC data log books maintained in the PCM laboratory as appropriate.

5.7.10.8.3.4 All IDOC and CDOC documentation for IHLAP related procedures is maintained and available for review for at least 5 years.

5.7.10.8.4 EMLAP Specific Technician Training Requirements:

5.7.10.8.4.1 EMLAP laboratory technicians must meet minimum educational requirements of a high school diploma or GED.

5.7.10.8.4.2 Initial demonstration of capability.

Each technician must complete at least 6 months documented training for Air Direct Exam (spore trap) and work/training in the EMLAP microbiology laboratory under the direct supervision of an EMLAP trained technician / analyst prior to performing unsupervised technician level work on EMLAP regulated client samples.

## Environment Testing

Each technician must read, understand and agree to follow the laboratory SOP as documented using the SOP Acknowledgement sign-off form.

Technician level personnel are limited to preparatory operations and assistance in all steps leading to the identification of microorganisms and may not perform analyses or be responsible for the final decisions related to the identity of microorganisms, except as described below:

“Technicians may function as analysts for Air-Direct Examination (spore traps) analysis after completion of 12 months documented on the job training and demonstrated proficiency. During the 12 month analyst training period, the trainee may perform work under the direct supervision of another qualified analyst. All work must be reviewed by another qualified analyst prior to release of data.”

Technicians functioning as analysts shall demonstrate proficiency by successful analysis of EMLAP PT samples or laboratory reference slides to document their ability to identify genus/groups of fungi reported. The technician must also complete and pass the laboratory Fungal Identification Examination/Quiz as administered by the Micro Dept. Manager. Once all requirements in 5.7.10.8.5.2 have been met, the technician will be approved to begin unsupervised prep/analysis of client samples. Documentation of formal approval to begin work is defined as the date signed by the Technical Director on the Demonstration of Capability Certification form.

### 5.7.10.8.4.3 Continuing Demonstration of Capability (CDOC).

Each technician must demonstrate continued proficiency at least every 6 months through the analysis of AIHA LAP provided PT samples or laboratory prepared Reference Slides. Results must fall within the AIHA LAP PT acceptance criteria or laboratory reference slide counting acceptance ranges as appropriate. CDOCs are documented via AIHA LAP PT reports or in the QC data log books maintained in the microbiology laboratory as appropriate.

### 5.7.10.8.4.4 All IDOC and CDOC documentation for EMLAP related procedures is maintained and available for review for at least 5 years

### 5.7.10.8.5 EMLAP Specific Analyst Training Requirements:

#### 5.7.10.8.5.1 EMLAP laboratory analysts must meet minimum educational requirements of a baccalaureate degree in microbiology, biology or related life science.

#### 5.7.10.8.5.2 Initial demonstration of capability.

Each analyst must complete at least 3 months of documented training from Air Direct Exam (spore trap) and at least 6 months of work/training in the EMLAP microbiology laboratory prior to performing unsupervised work on EMLAP regulated client samples. Each analyst must read, understand and agree to follow the laboratory SOP as documented using the SOP Acknowledgement sign-off form. Each analyst must prep and/or analyze as appropriate at least 2 blind reference material test samples. These samples may be an AIHA LAP provided PT samples or laboratory prepared Reference Slides. Results must fall within the PT acceptance range or laboratory reference slide counting acceptance ranges as appropriate and document proper identification of genus/species and genus/groups of fungi reported.

Once all requirements in 5.7.10.8.5.2 have been met, the technician/analyst will be approved to begin unsupervised prep/analysis of client samples. Documentation of formal approval to begin work is defined as the date signed by the Technical Director on the Demonstration of Capability Certification form.

5.7.10.8.5.3 Continuing Demonstration of Capability (CDOC). Each technician/analyst must demonstrate continued proficiency at least every 6 months through the analysis of AIHA LAP provided PT samples or laboratory prepared Reference Slides. Results must fall within the AIHA LAP PT acceptance criteria or laboratory reference slide counting acceptance ranges as appropriate. CDOCs are documented via AIHA LAP PT reports or in the QC data log books maintained in the microbiology laboratory as appropriate.

5.7.10.8.5.4 All IDOC and CDOC documentation for EMLAP related procedures is maintained and available for review for at least 5 years.

5.7.11 The Method Detection Limit (MDL). MDL studies are performed initially for a test and verified quarterly. Reverification occurs annually within 13 months of the initial MDL study. The MDL Procedure is as follows:

5.7.11.1 Estimate the MDL

5.7.11.1.1 Use the previous MDL study.

5.7.11.1.2 Use 3 times the standard deviation of (low level ideally) spikes.

5.7.11.1.3 Determine the concentration or region of your calibration curve where there is a significant change in sensitivity and use that concentration.  
 (This could also be at your instrument's limitation to detect.)

5.7.11.2 Determine the Initial MDL

5.7.11.2.1 Determination of the Blank MDL ( $MDL_b$ ) using method blank values for certain analytes is the first step to determining an MDL. For those analytes that show identified concentrations in Method Blanks, enter the values into the MDL spreadsheet (that is posted with the MDL procedure) and determine the MDL. If some but not all of the method blanks for individual analytes give numerical results, set the MDL equal to the highest result.

5.7.11.2.2 Determination of the Spiked MDL ( $MDL_s$ ) - Next perform the Spiked MDL ( $MDL_s$ ) study in one of the following ways

5.7.11.2.2.1 Single Instrument Spiked MDL

5.7.11.2.2.1.1 Prepare and analyze at least seven replicates at a concentration determined by the estimated MDL procedure. These seven replicates must be prepared in at least three separate batches and analyzed (run) on three different days. (Run each of the 3 batches on different days.) Enter the values obtained into the MDL spreadsheet (that is posted with the MDL procedure).

5.7.11.2.2.1.2 Use 2 or 3 study replicate values (for a total of 5) from the previous two MDL studies performed within the last 24 months assuming the spike concentration used for those studies is the



same concentration to be used for the initial MDL determination. In addition, prepare and analyze at least two more replicates at the same concentration. Populate the MDL spreadsheet with those values.

5.7.11.2.2.1.3 Submit both spreadsheets to the Department Manager or the QA Manager for review and approval.

## 5.7.11.2.2.2 Multiple Instrument Spiked MDL

5.7.11.2.2.2.1 Prepare and analyze at least two replicates per instrument (minimum seven total replicates) at a concentration determined by the estimated MDL procedure. Replicates must be prepared in at least three separate batches and analyzed (run) on three different days. Enter the values obtained into the MDL spreadsheet (that is posted with the MDL procedure).

5.7.11.2.2.2.2 Use 2 or more study replicate values per instrument from the previous two instruments' MDL studies performed within the last 24 months assuming the spike concentration used for those studies is the same concentration to be used for the initial MDL determination. Enter these values into the MDL spreadsheet.

5.7.11.2.2.2.3 Submit both spreadsheets to the Department Manager or the QA Manager for review and approval.

5.7.14.1 Method Blank (MB). For each method, the analyst must analyze reagent water blank daily to demonstrate that interferences from the analytical system is under control. The method blank is treated in the same manner as any sample, including any sample preparations such as digestions and extractions.

5.7.12.1 In the method blank, the concentration of any analyte of interest should not exceed the laboratory established practical quantitation limit (PQL). If contamination is detected in the blank, one of the following conditions must be met, or re-analysis of all associated samples is required (Section 5.8, Out of Control Procedures).

5.7.12.1.1 With documentation of client approval, the PQL may be increased above the level of contamination in the method blank and the associated samples. Report data with a "B" qualifier.

5.7.12.1.2 For sample results greater than or equal to 10 times the concentration of the method blank, the data may be reported with a flag indicating that low level contamination was detected in the method blank. Report data with a "B" qualifier.

5.7.13 Surrogates and Surrogate Recovery measured during the analysis of organic compounds. In order to monitor sample extraction efficiency, all client samples, blanks, and QC samples are fortified with surrogate spiking compounds before extraction and injection into the instrument.

5.7.13.1 Acceptance Criteria: Acceptable surrogate recoveries are contained in LIMS.

5.7.13.2 At a minimum, the laboratory annually updates surrogate recovery limits on a matrix-by-matrix basis for each test method.

5.7.13.3 If the surrogate recovery fails the above stated acceptance criteria, the analyst must proceed according to the out-of-control procedures discussed in Section 5.8.



5.7.13.4 Calibration curves. At a minimum, a 5 point calibration curve must be developed for each surrogate that is used in a particular test method.

5.7.14.2 Internal standard retention time - The retention times of the internal standards in the calibration verification standard must be evaluated immediately after or during GC or GC/MS acquisition.

5.7.14.2.1 If the retention time for any internal standard changes by more than 30 seconds from the retention time of the mid-point standard in the most recent initial calibration sequence, then the chromatographic system must be inspected for malfunctions and corrections must be made. Proceed according to the out-of-control procedures discussed in Section 5.8.

5.7.14.2.2 Internal standard response – If the area for any of the internal standards in the ICV or CCV changes by more than a factor of two (-50% to +100%) from that of the mid-point standard level in the most recent initial calibration sequence, the mass spectrometer or GC system must be inspected for malfunctions and corrections must be made unless the exceedance is caused by matrix interference. Proceed according to the out-of-control procedures discussed in Section 5.8.

5.7.14.3 Determination of Retention Time Window. Before establishing windows, be certain that the GC, GC/MS, or HPLC system is within optimum operating conditions. To determine the retention time window, make three injections of the sought for standard(s) or analyte(s) throughout the course of a 72 hour period. Serial injections over less than a 72-hour period result in retention time windows that are too tight.

5.7.14.3.1 Calculate the standard deviation of 3 absolute retention times for the standard(s).

5.7.14.3.2 The retention time window for individual peaks is defined as plus-or-minus (+/-) three (3) times the standard deviation of the absolute retention time.

5.7.14.3.3 In those cases where the standard deviation for a particular analyte is zero, the laboratory should use +/- 0.05 minutes as a retention time window.

5.7.14.3.4 The laboratory must calculate retention time windows for each standard on every existing GC column and on each new GC column when it is installed. The data is be retained by the laboratory for a period of 5 years.

5.7.14.4 For TCLP analysis, a matrix spike should be prepared and analyzed for each waste type (e.g., oil, solid) associated with a batch of 20 or fewer samples of similar matrix.

5.7.15 Additional Quality Control Parameters Required for Metals Analysis by 7000 Series Methods.

5.7.15.1 Dilution test. For each analytical batch, select one typical sample for serial dilution to determine whether interferences are present. The concentration of the analyte should be at least 25 times the estimated detection limit.

5.7.15.1.1 Determine the apparent concentration in the undiluted sample. Dilute the sample by a minimum of five fold (1 + 4) and reanalyze.

5.7.15.1.2 If all of the samples in the batch are below 10 times the detection limit(s), perform the spike recovery analysis.

5.7.15.1.3 Agreement within 10% between the concentration of the undiluted sample and five times the concentration of the diluted sample indicates the absence of interferences, and such samples may be analyzed without using the method of standard additions.

5.7.15.2 Spike Recovery Test: If results from the dilution test do not pass (or if none of samples in the batch are at a concentration level 10 times the MDL) the spike recovery test must be performed.

- 5.7.15.2.1 Withdraw another aliquot of the test sample and add a known amount of analyte to bring the concentration of the analyte to 2 to 5 times the original concentration.
- 5.7.15.2.2 If all of the samples in the batch have analyte concentrations below the detection limit, spike the selected sample at 20 times the detection limit.
- 5.7.15.2.3 Analyze the spiked sample and calculate the spike recovery. If the recovery is less than 85% or greater than 115%, the method of standard additions shall be used for all samples in the batch or data qualified and narrated with client report.

## 5.7.16 Additional Quality Control Parameters Required for Metals Analysis by ICP Methods.

5.7.16.1 The upper limit of the linear dynamic range must be established for each wavelength utilized. This is accomplished by measuring the signal response of a standard that is 10% higher than the upper range of the calibration curve.

5.7.16.2 The laboratory must establish and verify every six months an inter-element spectral interference correction routine to be used during sample analysis. See the individual ICP method SOPs for instructions on performing this test.

5.7.16.3 Duplicate or matrix spike duplicate samples. For all target metals, one sample per analytical batch is digested and analyzed in duplicate or as matrix spike duplicate. The results are compared and should meet the precision control limits established.

5.7.16.4 An instrument blank should be run after any sample giving a response that exceeds the calibration range of the instrument. This is done to show that there is no carry-over to the next analysis. The instrument blank shall consist of a high purity solvent (e.g., hexane for pesticide analysis by GC/ECD, methylene chloride for semi-volatiles analysis by GC/MS).

## 5.7.17 Additional Quality Control Parameters Required for Microbiological Test Methods.

5.7.17.1 Laboratory water quality must be checked and documented at the frequency indicated in the following table.

Table 5-2 Laboratory Water Quality Criteria

| Requirement                        | Criteria                         | Frequency                  |
|------------------------------------|----------------------------------|----------------------------|
| pH                                 | 5.5-7.5                          | Each day test is performed |
| Residual Chlorine                  | <1.0 mg/L                        | Each day test is performed |
| Conductivity                       | <1.0 $\mu$ mho/cm @25°C          | Each day test is performed |
| Heterotrophic Plate Count          | <500 colony forming units/ml     | Monthly                    |
| Bacteriological Ratio              | 0.8-3.0                          | Annually                   |
| Cd, Cr, Cu, Ni, Pb, Zn             | <0.05 mg/L each, total <1.0 mg/L | Annually                   |
| NH <sub>3</sub> , Organic Nitrogen | <0.1 mg/L                        | Monthly                    |
| TOC                                | <1.0 mg/L                        | Monthly                    |
| Student's t value                  | <2.78 (Annual use test)          | Annually                   |

5.7.17.2 The laboratory maintains records of monthly checks on sterile water and membrane filters as evidence of trends in contamination levels for microbiology through Heterotrophic Plate Count measurements. If the contamination level exceeds 1000 CFU/ml, all equipment should be checked for sterility and re-sterilized as necessary. In addition, if additional testing indicates that the problem is still present, then the room used for bacteriological testing should be cleaned with a disinfectant soap and plate counts measured again. Repeat the process as necessary.

## 5.8 Procedures for Assessing and Treating Out-of-Control Situations.

- 5.8.1 Quality control analyte samples consist of the following: Method Blanks, Duplicates, Laboratory Control Sample, Laboratory Control Sample Duplicate, Matrix Spike, Matrix Spike Duplicate, Initial Calibration Verification, Continuing Calibration Verification, BFB and DFTPP tunes, internal standards, surrogates, post digestion spikes, and dilution tests.
- 5.8.2 If any of the quality control analyte recovery values are outside either the laboratory or method-established control limit(s), they are considered to be out-of-control.
- 5.8.3 The resolution of an out-of-control situation, with identification and correction of the root cause, must be documented prior to initiating subsequent analyses. Documented corrective action (which may or may not require re-analysis) must also be performed if any of the recovery values in the LCS exhibit any "out-of- control" patterns.
- 5.8.4 Out-of-control conditions include the following special situations:
  - 5.8.4.1 When the acceptance criteria for the continuing calibration verification has a high bias and there are associated samples that are non-detects, then the non-detects may be reported. Otherwise, the samples affected by the unacceptable calibration verification shall be re-analyzed after the source of the problem has been corrected.
  - 5.8.4.2 When the acceptance criteria for the continuing calibration verification have a low bias, those sample results may be reported if they exceed a maximum regulatory limit or decision level. Otherwise, the samples affected by the unacceptable verification shall be re-analyzed after the source of the problem has been corrected.
  - 5.8.4.3 The root cause of such failures must be investigated and documented in a Non-Conformance Report (NCR). Any corrective actions identified as a result of the investigation must be implemented and documented in a Corrective Action Report (CAR) prior to reprocessing the affected sample batch.
  - 5.8.4.4 The QC requirements for each test method are listed LIMS test codes. They are also posted as charts and tables on the portal server. Unless otherwise indicated, if tables and charts have been produced, the precision and accuracy limits were determined from laboratory data.

### 5.8.5 Risks and Opportunities

The laboratory has adopted a risk management approach to Risk and Opportunities defined in ISO / IEC 17025:2017 section 8.5. This requires the laboratory to determine risks and opportunities, evaluate their severity and impact, and to address these risks with actions that will ultimately improve results and prevent future negative effects.

The laboratory addresses risks and opportunities quarterly as part of the laboratory's quarterly audit by way of the Risk Assessment Table and Chart. Risks are identified via the laboratory and upper management staff by the evaluation of corrective actions, internal audits, complaints, management reviews, procedures, occurrences, meeting discussions, incidents, and personnel suggestions. Each identified risk is recorded in the Risk Assessment Table (Table 5-3) and assigned a score from 1-5 for the likeliness of occurrence. This scale from 1 to 5 gives an indication of the likelihood of the occurrence. (1=Unlikely, 2=Seldom, 3=Occasional, 4=Likely, 5=Definite). In addition, a severity of impact score is assigned from 1-5. This rates the impact of the event, if the event occurred. (1=Insignificant, 2=Marginal, 3=Moderate, 4=Critical, 5=Catastrophic).

These scores are combined. Each score combination correlates to a risk rating, which shows the necessity of action requirement. This risk ratings are Extreme, High, Medium, and Low. This risk

rating prompts an action in accordance with the rating: Extreme - Act Now, High - Further Action Necessary Soon, Medium - Further Action Optional, Low - No Further Action.

The Risk Assessment Chart (Table 5-3) assists with the visualization of the risk severity and corresponds to the Risk Assessment Table, where each risk data point will show up on this “heat map” (termed by the colors used) of Likelihood vs. Impact. The heat map is shaded from green to red, where green indicates low risk and no action is necessary, yellow indicates medium risk and action is optional, orange indicates high risk and action is necessary soon, and red indicates extreme risk and action is needed immediately. In response to these results, actions taken to mitigate the specified risks are detailed in the Risk Assessment Table to track progress.

This Risk Assessment Table and Chart is included in the Quarterly Report to Management.

Identified Risks are mitigated through:

- Training and Awareness
  - Continued Audits (Internal, External, Customer, Third Party)
  - Design and organization for efficiency, reliability, ease, and maintainability
- After implementation of the risk action, the risks are monitored by tracking and evaluating performance, ensure “lesson learned” feedback goes into future planning and activities, and by established metrics (such as QC charting).

All of these stated components will be evaluated by upper and departmental management during the annual management review to verify the effectiveness of the risk resolution.

### 5.8.6 Improvement

Opportunities for improvement can be identified through risk management approach utilizing the Risk Assessment Table and Chart, or by the review of the operational procedures, the use of the policies, overall objectives, audit results, corrective actions, management review, suggestions from personnel, risk assessment, analysis of data, and proficiency testing results.

The laboratory identifies and selects opportunities for improvement and implements the necessary actions in a number of ways.

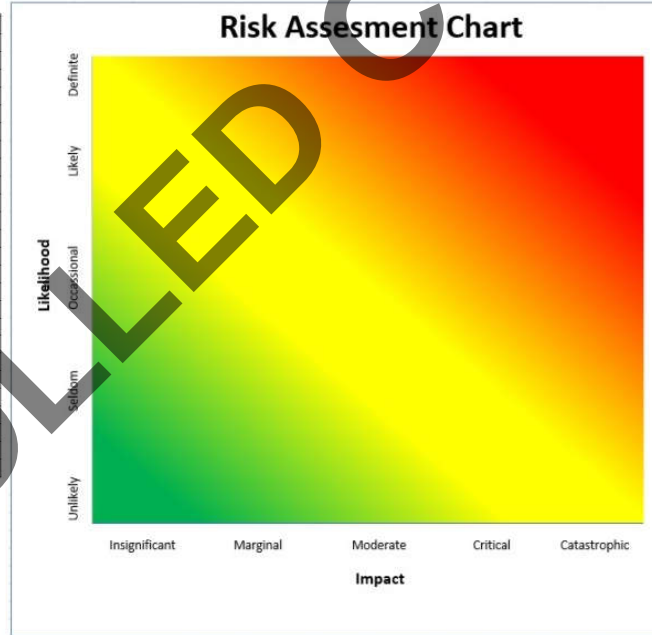
Opportunities for improvement are identified by using the following practices:

1. Corrective Actions
2. Data or QA Review
3. Internal Audits
4. Weekly management meeting discussions
5. Departmental management reviews
6. Proficiency testing results
7. Review of operational procedures
8. Feedback from personnel and clients

As with Risk and Opportunities, improvements will be evaluated by upper and departmental management during the annual management review to verify the effectiveness of the risk resolution.

Table 5-3 Risk Assessment Table and Chart

| Risk Assessment Table          |      |                  |              |                    |
|--------------------------------|------|------------------|--------------|--------------------|
| Description of Identified Risk | Risk | Likelihood (1-5) | Impact (1-5) | Action Requirement |
|                                | R1   |                  |              | Act Now            |
|                                | R2   |                  |              | Act Now            |
|                                | R3   |                  |              | Act Now            |
|                                | R4   |                  |              | Act Now            |
|                                | R5   |                  |              | Act Now            |
|                                | R6   |                  |              | Act Now            |
|                                | R7   |                  |              | Act Now            |
|                                | R8   |                  |              | Act Now            |
|                                | R9   |                  |              | Act Now            |
|                                | R10  |                  |              | Act Now            |
|                                | R11  |                  |              | Act Now            |
|                                | R12  |                  |              | Act Now            |
|                                | R13  |                  |              | Act Now            |
|                                | R14  |                  |              | Act Now            |
|                                | R15  |                  |              | Act Now            |
|                                | R16  |                  |              | Act Now            |
|                                | R17  |                  |              | Act Now            |
|                                | R18  |                  |              | Act Now            |
|                                | R19  |                  |              | Act Now            |
|                                | R20  |                  |              | Act Now            |
|                                | R21  |                  |              | Act Now            |
|                                | R22  |                  |              | Act Now            |
|                                | R23  |                  |              | Act Now            |
|                                | R24  |                  |              | Act Now            |
|                                | R25  |                  |              | Act Now            |



| Risk Rating    |                               |
|----------------|-------------------------------|
| Low            | No Further Action             |
| Medium         | Further Action Optional       |
| High           | Further Action Necessary Soon |
| Extreme        | Act Now                       |
| Likelihood     | Impact                        |
| Unlikely (1)   | Insignificant (1)             |
| Seldom (2)     | Marginal (2)                  |
| Occasional (3) | Moderate (3)                  |
| Likely (4)     | Critical (4)                  |
| Definite (5)   | Catastrophic (5)              |



## 5.9 Inter-laboratory QA and QC

- 5.9.1 Each section of the laboratory may be given blind and double blind samples to analyze for requested parameters. Blind samples may be assigned in containers to be diluted, digested, and/or extracted and analyzed by the appropriate laboratory section. Double-blind samples arrive on a pre-scheduled basis from a “client” as real samples to be analyzed by designated analytical sections for specific analytes.
- 5.9.2 Blind QC samples may be used as a test of proficiency for analysts needing certification and/or qualification for performing an analysis. The Section Supervisor should obtain the QC sample from, either, the Quality Assurance Department or from a source independent of the source of standards for the analysis.
- 5.9.3 Double blind samples represent quality control samples whose analyte concentrations are known to, either, an outside source, such as a client, or an inside source, such as the Quality Control Manager, Project Managers, or the Technical Director.
  - 5.9.3.1 Double blind samples will arrive in the lab as real samples and their identity will not be known to anyone as quality control samples except for Quality Assurance and Department Manager.
  - 5.9.3.2 The results of these double-blind samples will be sent to the “client” to be compared to the true value of the samples. The laboratory’s performance on these samples may be compared to other laboratories in the program (if applicable). These results will be mailed to the Quality Assurance Department.
  - 5.9.3.3 When the double blind samples are created within the laboratory, a report will be generated by the Quality Assurance Manager or the Technical Director that indicates the true value of the analyte. These values will be compared to the reported value by the laboratory. The analysis of double blind samples is used as an aid to improve quality control within the laboratory.

## 5.10 Sample Dilution

- 5.10.1 All instruments are periodically calibrated with calibration curves. The calibrations typically are developed by comparison of area or intensity against sample concentration. Per the requirements of the various accreditation agencies, the calibrations are verified initially and periodically, usually every day or every 12 hours.
- 5.10.2 Various test methods additionally require that the linear range of the instrument is determined on a specified frequency.
- 5.10.3 In the event that a measured sample concentration exceeds the concentration of the highest calibration standard or the linear range of the instrument (where determined), the sample must be diluted per the following procedure.
  - 5.10.3.1 The analyst should attempt to dilute the sample so that the measured concentration of the diluted sample is approximately 60% that of the highest standard in the calibration curve.
  - 5.10.3.2 Sample must be diluted with the same matrix as the undiluted sample as indicated below.
    - 5.10.3.2.1 Aqueous samples are diluted with reagent grade distilled water.
    - 5.10.3.2.2 Extracts in solvents are diluted with the same solvent of the same purity.
    - 5.10.3.2.3 ICP digestates are diluted with nitric acid or hydrochloric acid-water mixtures that emulate the original matrix.



5.10.3.3 The sample dilution is reported in the LIMS and on the data sheet. The results are reported to the client and the reporting limits are automatically adjusted by the LIMS system to account for the sample dilution.

Table 5-4 Summary of Calibration and QC Procedures for Various Tests

| Method                 | QC Check                                              | Frequency                                                                                                                                                                                                                                                                                                    | Acceptance Criteria                                                                     | Corrective Action (3,4)                                                                                                      |
|------------------------|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| SW-8081B<br>Pesticides | Five-point initial calibration for all analytes       | Initial calibration prior to sample analysis                                                                                                                                                                                                                                                                 | RF = 20%                                                                                | Correct problem then repeat initial calibration                                                                              |
| SW-8082A<br>PCB        |                                                       |                                                                                                                                                                                                                                                                                                              | Linear - least squares regression<br>$r > 0.995$                                        |                                                                                                                              |
| SW-8151A<br>Herbicides | Second source calibration verification standard (ICV) | Once per five point initial calibration - from second source.                                                                                                                                                                                                                                                | All analytes within 15% of target value<br>GRO/DRO = 15% PRO = 20%                      | Correct problem then repeat initial calibration                                                                              |
| SW-8015C<br>Organics   | Retention time window                                 | System set-up                                                                                                                                                                                                                                                                                                | 3 times standard deviation for each analyte retention time from 72 hour study           | Correct problem then re-analyze all samples analyzed since retention time check                                              |
| GRO<br>DRO<br>FL-PRO   | Continuing calibration verification                   | Before sample analysis, after every 10 samples, and at the end of the analysis sequence with varying concentrations<br>GRO/DRO Every 12 hours before sample analysis, after every 10 samples, and at the end of the analytical sequence<br>GRO/DRO = RT window<br>required analyzed at same frequency as CCV | All analytes within 15% of target value<br>GRO/DRO = 20% PRO = 25%<br>8081B/8082A = 20% | Correct problem then repeat initial continuing calibration verification and re-analyze all samples since last successful CCV |
| SW-8315A<br>Carbonyls  | Breakdown check (Endrin and DDT)(1)                   | Daily prior to analysis of samples                                                                                                                                                                                                                                                                           | Degradation <15%                                                                        | Inlet column maintenance; repeat breakdown check. Correct problem                                                            |
|                        | Method Blank                                          | Once per analytical batch                                                                                                                                                                                                                                                                                    | No analytes detected > PQL                                                              | Then re-prepare and analyze the method and all samples processed with the contaminated blank.                                |
|                        | LCS/LCSD                                              | One per prep batch                                                                                                                                                                                                                                                                                           | See LIMS Test codes                                                                     | Re-prepare and analyze the LCS/LCSD & all samples in the affected batch                                                      |
|                        | Surrogate Spike                                       | Every sample, spiked sample, standard, and method blank                                                                                                                                                                                                                                                      | See LIMS Test codes                                                                     | Check system, re-inject, re-extract                                                                                          |
|                        | MS/MSD                                                | One per prep batch                                                                                                                                                                                                                                                                                           | See LIMS Test codes                                                                     | None - Narrate the results in LIMS                                                                                           |
|                        | IDOC                                                  | Every time a new analyst performs the test method for the first time - second source.                                                                                                                                                                                                                        | See LIMS Test codes                                                                     | Analyst cannot perform the test method until the IDOC passes method criteria                                                 |
|                        | LLOQ                                                  | Initial<br>Annually                                                                                                                                                                                                                                                                                          | LCS range $\pm 20\%$<br>0.5-2 times established LLOQ                                    | Re-evaluate, repeat study                                                                                                    |
|                        | MDL                                                   | Initial Blank & Spike MDL Study<br>Quarterly Verification. Annual<br>MDL Study Re verification                                                                                                                                                                                                               | MDL < Spike Level<br>Analyte specific per test                                          | Re verification, repeat study                                                                                                |
|                        | Second column confirmation (2)                        | 100% for all positive results (not for 8015B)                                                                                                                                                                                                                                                                | Same results as primary column analysis                                                 | Only report the results that match. Use the highest results                                                                  |
| SW-8260D<br>SW-8270E   | Tune BFB for 8260B<br>Tune DFTPP for 8270D            | Prior to initial calibration<br>Prior to initial calibration                                                                                                                                                                                                                                                 |                                                                                         | Analyst cannot perform the test until the tune passes method criteria                                                        |
|                        | Five-point initial calibration for all analytes       | Initial calibration prior to sample analysis.                                                                                                                                                                                                                                                                |                                                                                         | Correct problem then repeat initial calibration                                                                              |
|                        | Second source calibration verification standard (ICV) | Once per five point initial calibration-second source.                                                                                                                                                                                                                                                       | All analytes within 30% of target value                                                 | Correct problem then repeat initial calibration                                                                              |
|                        | Retention time window                                 | Each Sample                                                                                                                                                                                                                                                                                                  | Relative retention time (RRT) of                                                        | Correct problem then re-analyze                                                                                              |

| Method               | QC Check                                              | Frequency                                                                                   | Acceptance Criteria                                                                                                                                                                        | Corrective Action (3,4)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                      | calculated for each analyte                           |                                                                                             | the analyte within 0.06 RRT units of the RRT                                                                                                                                               | all samples analyzed since retention time check                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                      | Continuing calibration verification                   | Daily prior to analysis of samples and every 12 hours of analysis time.                     |                                                                                                                                                                                            | Correct problem then repeat initial continuing calibration verification and re-analyze all samples since last successful CCV. If not met the system should be evaluated, and corrective action should be taken before analysis. If criterion is not met for more than 20% of the compounds included in the initial calibration, then corrective action must be taken prior to analysis of samples. Inspect GC/MS for malfunctions; mandatory re-analysis of samples analyzed while system was malfunctioning. Correct problem then re-prepare and analyze method blank and all samples processed with the Contaminated blank. |
| SW-8260D<br>SW-8270E | Internal Standards                                    | Every sample/standard                                                                       | Target compounds $\leq 20\%$<br>Retention Time RT $\pm 30$ seconds from RT of the mid-point in the CCV/ICAL (sample/standard)<br>EICP area within -50% to +100% of ICAL mid-point standard |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                      | Internal Standards                                    | Every sample/standard                                                                       | Target compounds $\leq 20\%$                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                      | Method Blank                                          | Once per analytical batch                                                                   | No analytes detected > PQL                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                      | LCS/LCSD                                              | One per prep batch                                                                          | See LIMS Test codes                                                                                                                                                                        | Re-prepare and analyze the LCS/LCSD and all samples in the affected analytical batch                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|                      | Surrogate Spike                                       | Every sample, spiked sample, standard, and method blank                                     | See LIMS Test codes                                                                                                                                                                        | Check system, re-inject, re-extract                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                      | MS/MSD                                                | One per prep batch                                                                          | See LIMS Test codes                                                                                                                                                                        | None - Narrate the results in LIMS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                      | IDOC                                                  | Every time a new analyst performs the test method for the first time - second source.       | See LIMS Test codes<br>LCS Accuracy for Limits                                                                                                                                             | Analyst cannot perform the test method until the IDOC passes method criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                      | LLOQ                                                  | Initial<br>Annually                                                                         | LCS range $\pm 20\%$<br>0.5-2 times established LLOQ                                                                                                                                       | Re-evaluate, repeat study                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                      | MDL                                                   | Initial Blank & Spike MDL Study<br>Quarterly Verification. Annual MDL Study Re verification | MDL < Spike Level<br>Analyte specific per test                                                                                                                                             | Re verification, repeat study                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| SW-7000B<br>Metals   | 3-point initial calibration (min. 3 stds and a blank) | Daily initial calibration prior to sample analysis                                          | Correlation coefficient $> 0.995$ for linear regression                                                                                                                                    | Correct problem then repeat initial calibration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                      | Second source calibration verification standard (ICV) | Once per initial daily calibration second source.                                           | All analytes within 10% of target value                                                                                                                                                    | Correct problem then repeat initial calibration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                      | Continuing calibration verification                   | Before sample analysis, after every 10 samples, and at the end of the analysis sequence     | All analytes within 20% of target value                                                                                                                                                    | Correct problem then repeat initial continuing calibration verification and re-analyze all samples since last successful CCV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                      | Method Blank                                          | Once per analytical batch                                                                   | No analytes detected > PQL                                                                                                                                                                 | Correct problem then re-prepare and analyze method blank and all samples processed with that blank.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|                      | LCS/LCSD                                              | One per prep batch                                                                          | See LIMS Test codes                                                                                                                                                                        | Re-prepare and analyze the LCS/LCSD and all samples in the affected batch.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                      | MS/MSD                                                | One per prep batch                                                                          | See LIMS Test codes                                                                                                                                                                        | None - Narrate the results in LIMS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                      | IDOC                                                  | Every time a new analyst performs the test method for the first time - second source.       | See LIMS Test codes<br>LCS Accuracy for Limits                                                                                                                                             | Analyst cannot perform the test method until the IDOC passes method criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                      | LLOQ                                                  | Initial<br>Quarterly                                                                        | Spike $\pm 35\%$ , RSD $< 20\%$<br>Spike $\pm 35\%$ , RSD $< 20\%$                                                                                                                         | Re-evaluate, repeat study                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                      | MDL                                                   | Initial Blank & Spike MDL Study<br>Quarterly Verification. Annual MDL Study Re verification | MDL < Spike Level<br>Analyte specific per test                                                                                                                                             | Re verification, repeat study                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                      | Dilution test: 1:4 dilution                           | Each preparatory batch                                                                      | Five times dilution sample result                                                                                                                                                          | Perform post digestion spike                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Method                           | QC Check                                              | Frequency                                                                                                     | Acceptance Criteria                                                                                                                                     | Corrective Action (3,4)                                                                                                      |
|----------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
|                                  |                                                       | Sample concentration must be 20X MDL                                                                          | must be within 10% of the undiluted sample result                                                                                                       | addition                                                                                                                     |
|                                  | Recovery Test                                         | When dilution test fails or sample concentration < 20X MDL                                                    | Recovery within 15% of target results                                                                                                                   | Perform method of standard additions                                                                                         |
| SW-9010C<br>CN Distil<br>Cyanide | Initial calibration (six standards and a blank)       | Daily initial calibration prior to sample analysis                                                            | Correlation coefficient >0.995 for linear regression                                                                                                    | Correct problem then repeat initial calibration                                                                              |
|                                  | Distilled standards (one high and one low)            | Once per initial daily calibration                                                                            | All analytes within 10% of target value                                                                                                                 | Correct problem then repeat initial calibration                                                                              |
|                                  | Second source calibration verification standard (ICV) | Once per initial daily calibration second source.                                                             | All analytes within 15% of target value                                                                                                                 | Correct problem then repeat initial calibration                                                                              |
|                                  | Continuing calibration verification                   | Before sample analysis, after every 10 samples, and at the end the analysis sequence - varying concentrations | All analytes within 15% of target value                                                                                                                 | Correct issue, repeat initial continuing calibration verification and re-analyze all samples since last successful CCV.      |
|                                  | Method Blank                                          | Once per analytical batch                                                                                     | No analytes detected > PQL                                                                                                                              | Correct problem, re-prepare and analyze method blank and all samples processed w/ contaminated blank.                        |
|                                  | LCS/LCSD                                              | One per prep batch                                                                                            | All analytes within 15% of target value                                                                                                                 | Re-prepare, reanalyze the LCS/LCSD and all samples in the analytical batch                                                   |
|                                  | MS/MSD                                                | One per prep batch (9010B)<br>Every 10 samples (9012A)                                                        | All analytes within 30% of target value                                                                                                                 | None - Narrate the results in LIMS                                                                                           |
|                                  | IDOC                                                  | Every time a new analyst performs the test method for the first time - second source.                         | See LIMS Test codes<br>LCS Accuracy for Limits                                                                                                          | Analyst cannot perform the test method until the IDOC passes method criteria                                                 |
|                                  | LLOQ                                                  | Initial<br>Quarterly                                                                                          | Spike $\pm 35\%$ , RSD <20%<br>Spike $\pm 35\%$ , RSD <20%                                                                                              | Re-evaluate, repeat study                                                                                                    |
|                                  | MDL                                                   | Initial Blank & Spike MDL Study<br>Quarterly Verification, Annual MDL Study Re verification                   | MDL < Spike Level<br>Analyte specific per test                                                                                                          | Re verification, repeat study                                                                                                |
| EPA-624.1<br>EPA-625.1           | Tune BFB for 8260B<br>Tune DFTPP for 8270C            | Prior to initial calibration and continuing calibration verification every 12 hours                           | See individual method for tune criteria.                                                                                                                | Analyst cannot perform the test method until the tune passes method criteria                                                 |
|                                  | 5-point initial calibration for all analytes          | Initial calibration prior to sample analysis                                                                  | %RSD<35%                                                                                                                                                | Correct problem then repeat initial calibration                                                                              |
|                                  | Second source calibration verification standard (ICV) | Once per 5 point initial calibration                                                                          | All analytes within range of method criteria (SOPs/Methods)                                                                                             | Correct problem then repeat initial calibration                                                                              |
|                                  | Continuing calibration verification                   | Daily prior to analysis of samples - varying concentration.                                                   | All calibration analytes within Range of method specified criteria (SOPs/Methods)                                                                       | Correct problem then repeat initial continuing calibration verification and re-analyze all samples since last successful CCV |
|                                  | Internal Standards                                    | Every sample/standard                                                                                         | Retention time $\pm 30$ seconds from retention time of the mid-Point in the CCV/ICAL                                                                    | Inspect GC/MS for malfunctions; mandatory re-analysis of samples analyzed while system was malfunctioning.                   |
|                                  | Retention time window calculated for each analyte     | Each Sample                                                                                                   | Relative retention time (RRT) of the analyte within 30 seconds of the RT (sample/standard)<br>EICP area within -50% to +100% of ICAL mid-point standard | Correct problem then re-analyze all samples analyzed since retention time check                                              |
|                                  | Method Blank                                          | Once per analytical batch                                                                                     | No analytes detected > PQL                                                                                                                              | Correct problem then re-prepare and analyze method blank and all samples                                                     |

| Method                 | QC Check                                                                  | Frequency                                                                                                             | Acceptance Criteria                                                                   | Corrective Action (3,4)                                                              |
|------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|                        |                                                                           |                                                                                                                       |                                                                                       | processed with this blank.                                                           |
|                        | LCS/LCSD                                                                  | One per prep batch                                                                                                    | See LIMS Test codes                                                                   | Re-prepare and analyze the LCS/LCSD and all samples in the affected analytical batch |
|                        | Surrogate Spike                                                           | Every sample, spiked sample, standard, and method blank                                                               | See LIMS Test codes                                                                   | Check system, re-inject, re-extract                                                  |
|                        | MS/MSD                                                                    | One per prep batch                                                                                                    | See LIMS Test codes                                                                   | None - Narrate the results in LIMS                                                   |
|                        | IDOC                                                                      | Every time a new analyst performs the test method for the first time - second source.                                 | See LIMS Test code or QC Charts LCS Accuracy for Limits                               | Analyst cannot perform the test method until the IDOC passes method criteria         |
|                        | MDL                                                                       | Initial Blank & Spike MDL Study Quarterly Verification. Annual MDL Study Re-verification                              | MDL < Spike Level<br>Analyte specific per test                                        | Re verification, repeat study                                                        |
| TO-14A<br>TO-15<br>VOC | New Canister Check                                                        | New - pressurize with humidified UHP nitrogen; analyze after aging 24 hours to determine cleanliness                  | demonstrate <0.2ppb of target analytes                                                | Re-clean canister and retest                                                         |
|                        | Canister Leak Check                                                       | Pressurize to 30 psig and check pressure after 24 hours                                                               | Pressure should not vary more than +/- 2 psig over 24 hours                           | Repair canister and retest                                                           |
|                        | Canister Blank Check                                                      | Pressurize to 30 psig with humidified UHP nitrogen                                                                    | demonstrate <0.2ppbv of target analytes; requires 24 hours of aging prior to analysis | Re-clean canister and retest                                                         |
|                        | Sampling System Certification (Zero Air Certification using UHP Nitrogen) | Pass humidified UHP nitrogen through sampling system and demonstrate <0.2ppbv of target analytes                      | demonstrate <0.2ppbv of target analytes                                               | Re-clean canister and retest                                                         |
|                        | Dynamic Calibration System Certification                                  | Pass humidified UHP nitrogen through the dynamic calibration system                                                   | demonstrate <0.2ppbv of target analytes                                               | Clean system and retest                                                              |
|                        | Sampler System Certification                                              | Use humidified gas standards to compare results from a canister collected with the sampling system and on-line GC-MS  | Recovery between 90 and 110%                                                          | Clean system and retest                                                              |
|                        | Instrument Performance Check (BFB Tuning)                                 | Prior to the analysis of any samples, blanks, or calibration standards, load 50 ng or less of BFB every 24 hours      | Verify the mass spectral ion abundance is in accordance with Table 7-1 of SOP         | Retune or perform routine maintenance then retune                                    |
|                        | Initial Calibration (ICal)                                                | Prior to analysis of samples and blanks but after the instrument performance check (following any corrective action): | R <sup>2</sup> >0.995                                                                 | Correct problem and recalibrate                                                      |
|                        |                                                                           | Variation of Relative Response Factor (RRF)                                                                           | <30% RSD for the RRF each target analyte                                              | Correct problem and recalibrate                                                      |
|                        |                                                                           | Variation of Relative Retention Time (RRT)                                                                            | Each standard within 0.06 RRT Units of mean for each analyte                          | Correct problem and recalibrate                                                      |
|                        | Internal Standard (IS) ICAL Response                                      | Each IS response                                                                                                      | Must be within 40% of the mean response over the ICAL                                 | Correct problem and recalibrate                                                      |
|                        |                                                                           | IS ICAL Retention Time                                                                                                | Each IS should be within 20 s of the mean retention time over the ICAL                |                                                                                      |
|                        | Daily Calibration                                                         | Prior to the analysis of samples                                                                                      | Must be within +/- 30% for ICAL                                                       | Reanalyze; if still fails, perform                                                   |

| Method                        | QC Check                                               | Frequency                                                                                              | Acceptance Criteria                                                                                                                                        | Corrective Action (3,4)                                                                                                      |
|-------------------------------|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
|                               | (Continuing Calibration Verification-CCV)              | and blanks but after tuning criteria have been met, analyze mid-level standard                         | for each target analyte                                                                                                                                    | instrument maintenance and reanalyze                                                                                         |
|                               | Laboratory Method Blank (LMB)                          | Analyze one every 24 hours; pressurize (2 atm) clean canister with >20% relative humidity UHP nitrogen | Blank should not contain any target analyte greater than PQL. Each IS response in the blank must be within +/- 0.33 minutes of the most recent calibration | Reanalyze; prepare new canister and analyze                                                                                  |
| TO-14A                        |                                                        |                                                                                                        |                                                                                                                                                            |                                                                                                                              |
| TO-15                         |                                                        |                                                                                                        |                                                                                                                                                            |                                                                                                                              |
| VOC                           |                                                        |                                                                                                        |                                                                                                                                                            |                                                                                                                              |
|                               | Sample Technical Acceptance Criteria                   | Analyzed on a GCMS system                                                                              | Meeting the BFB Tune, ICAL, and continuing calibration criteria outlined in SOP                                                                            | Reanalyze sample. Qualify / Narrate data appropriately                                                                       |
|                               |                                                        | Analyzed with a LMB meeting criteria                                                                   | Must meet method in SOP. All target analytes within ICAL range. Ea. IS RT within +/- 30% minutes of the most recent calibration.                           |                                                                                                                              |
| EPA-245.1 Mercury             | Initial calibration (minimum 5 standards and a blank). | Daily initial calibration prior to sample analysis.                                                    | Correlation coefficient >0.995 for linear regression.                                                                                                      | Correct problem then repeat initial calibration.                                                                             |
|                               | Linear Dynamic Range                                   | Once Annually                                                                                          | Analyte within 10% of target value (not necessary if diluting within calibration curve).                                                                   | Calibration range lowered to meet LDR results.                                                                               |
|                               | Second source calibration verification standard (ICV)  | Once per five point initial Calibration - second source.                                               | All analytes within 5% of target value                                                                                                                     | Correct problem then repeat initial calibration                                                                              |
|                               | Continuing calibration verification                    | Before sample analysis, after every 10 samples, and at the end of the analysis sequence -              | All calibration analytes within 10% of target value before sample analysis                                                                                 | Correct problem then repeat initial continuing calibration verification and re-analyze all samples since last successful CCV |
|                               | Method Blank                                           | Once per analytical batch                                                                              | No analytes detected > PQL                                                                                                                                 | Correct problem then re-prepare and analyze method blank and all samples processed with that blank                           |
|                               | LCS/LCSD                                               | One per prep batch                                                                                     | See LIMS Test codes                                                                                                                                        | Re-prepare and analyze the LCS/LCSD and all samples in that batch                                                            |
|                               | MS/MSD                                                 | One per prep batch                                                                                     | See LIMS Test codes                                                                                                                                        | None - Narrate the results in LIMS                                                                                           |
|                               | IDOC                                                   | Every time a new analyst performs the test method for the first time - second source.                  | See LIMS Test codes<br>LCS Accuracy for Limits                                                                                                             | Analyst cannot perform the test method until the IDOC passes method criteria                                                 |
|                               | LLOQ                                                   | Initial<br>Quarterly                                                                                   | Spike +35%, RSD <20%<br>Spike +35%, RSD <20%                                                                                                               | Re-evaluate, repeat study                                                                                                    |
|                               | MDL                                                    | Initial Blank & Spike MDL Study<br>Quarterly Verification. Annual MDL Study Re verification            | MDL < Spike Level<br>Analyte specific per test                                                                                                             | Re verification, repeat study                                                                                                |
| EPA 200.7 SW-6010D ICP Metals | Initial calibration (minimum 1 standards and a blank)  | Initial calibration prior to sample analysis                                                           | Not applicable                                                                                                                                             | Correct problem then repeat initial calibration.                                                                             |
|                               | CRI /LLICV/LLCCV                                       | Set to PQL                                                                                             | Result must be greater than calibration blank, <PQL<br>+30% for all analytes                                                                               | Correct problem the repeat initial calibration                                                                               |
|                               | Check Standard                                         | Calibration verification                                                                               | All analytes within 5% of target value                                                                                                                     | Correct problem, then reanalyze the calibration standard and check std.                                                      |
|                               | Second source calibration verification standard (ICV)  | Once per initial calibration - second source.                                                          | Mean value of all analytes within 5% of target value for 200.7 within 10% for 6010D                                                                        | Fix problem, repeat initial calibration                                                                                      |

| Method                              | QC Check                                              | Frequency                                                                                   | Acceptance Criteria                                                                                             | Corrective Action (3,4)                                                                                                                    |
|-------------------------------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
|                                     | ICSA                                                  | Interference analytes Ca, Fe, Mg, Al<br>Beginning, end & periodic intervals                 | Concentrations of analytes within 20% of target value                                                           | Stop analysis; fix problem. Reanalyze ICS; reanalyze all affected samples.                                                                 |
|                                     | ICSAB                                                 | Interference analytes Ca, Fe, Mg, Al<br>Beginning, end & periodic intervals                 | Concentrations of analytes within 20% of target value                                                           | Stop analysis; fix problem. Reanalyze ICS; reanalyze all affected samples.                                                                 |
| EPA 200.7<br>SW-6010D<br>ICP Metals | Linear dynamic range                                  | Every six months                                                                            | All analytes within 10% of target value.                                                                        | Calibration range adjusted to meet calibration results.                                                                                    |
|                                     | Calibration blank                                     | After every calibration verification                                                        | No analytes detected within +/- one MDL                                                                         | Correct problem then repeat initial continuing calibration verification and re-analyze all samples since last successful calibration blank |
|                                     | Continuing calibration verification (CCV)             | Before sample analysis, after every 10 samples, and at the end of the analysis sequence -   | Analytes within 10% of target value for method 200.7, within 10% for method 6010D                               | Repeat calibration and re-analyze all samples since last successful calibration verification.                                              |
|                                     | Method Blank                                          | Once per analytical batch                                                                   | No analytes detected within +/- one MDL                                                                         | Correct problem then re-prepare and analyze method blank and all samples processed with the contaminated blank                             |
|                                     | Duplicate                                             | One per batch<br>Sample concentration must be 4X MDL or greater for valid results           | %RSD must be 20% for water<br>%RSD must be 30% for soil                                                         | Reanalyze duplicate sample.<br>Check system, re-prepare, re-analyze as needed                                                              |
|                                     | LCS/LCSD                                              | One per prep batch                                                                          | 200.7: within 15% of target<br>6010D: within 20% of target                                                      | Re-prepare and analyze the LCS/LCSD and all samples in that batch                                                                          |
|                                     | Dilution test: 1:4 dilution                           | Each preparatory batch<br>Sample concentration must be 20X MDL                              | Five times dilution sample result must be within 20% of the undiluted sample result for 6010D and 10% for 200.7 | Perform post digestion spike addition                                                                                                      |
|                                     | Recovery Test                                         | When dilution test fails or sample concentration < 20X MDL                                  | Recovery within 25% of target value                                                                             | Perform method of standard additions                                                                                                       |
|                                     | MS/MSD                                                | One per prep batch                                                                          | All analytes within 20% RPD<br>MS- (200.7 70-130%)<br>(6010D 75-125%)<br>PDS-(200.7 85-115%)<br>(6010D 80-120%) | Check system, re-prepare, re-analyze as needed<br>Sample Conc. > 10X spike Conc., if not, cannot validate MS                               |
|                                     | IDOC                                                  | Every time a new analyst performs the test method for the first time - second source.       | See LIMS Test code or QC Charts<br>LCS Accuracy for Limits                                                      | Analyst cannot perform the test method until the IDOC passes method criteria                                                               |
|                                     | LLOQ                                                  | Initial<br>Quarterly                                                                        | Spike +35%, RSD <20%<br>Spike +35%, RSD <20%                                                                    | Re-evaluate, repeat study                                                                                                                  |
|                                     | MDL                                                   | Initial Blank & Spike MDL Study<br>Quarterly Verification. Annual MDL Study Re verification | MDL < Spike Level<br>Analyte specific per test                                                                  | Re verification, repeat study                                                                                                              |
| EPA 200.8<br>SW-6020 B<br>Metals    | Initial calibration (minimum 1 standards and a blank) | Initial calibration prior to sample analysis                                                | Not applicable                                                                                                  | Correct problem then repeat initial calibration.                                                                                           |
|                                     | CRI /LLICV/LLCCV                                      | Set to PQL                                                                                  | Result must be greater than calibration blank, <PQL<br>+30% for all analytes                                    | Correct problem the repeat initial calibration                                                                                             |
|                                     | Check Standard                                        | Calibration verification                                                                    | All analytes within 5% of target value                                                                          | Correct problem, then reanalyze the calibration standard and check std.                                                                    |
|                                     | Second source calibration verification standard (ICV) | Once per initial calibration - second source.                                               | Mean value of all analytes within 5% of target value for 200.8 within 10% for 6020B                             | Correct problem then repeat initial calibration                                                                                            |
|                                     | ICSA                                                  | Interference analytes Ca, Fe, Mg, Al                                                        | Concentrations of analytes                                                                                      | Terminate analysis; correct problem                                                                                                        |



| Method                     | QC Check                                              | Frequency                                                                                                   | Acceptance Criteria                                                                                                   | Corrective Action (3,4)                                                                                                                    |
|----------------------------|-------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
|                            |                                                       | Beginning, end & periodic intervals (every 12 hours)                                                        | within 20% of target value                                                                                            | reanalyze ICS; reanalyze all affected samples.                                                                                             |
|                            | Linear dynamic range                                  | Every six months                                                                                            | All analytes within 10% of target value.                                                                              | Calibration range adjusted to meet calibration results.                                                                                    |
| EPA 200.8 SW-6020 B Metals | Calibration blank                                     | After every calibration verification                                                                        | No analytes detected within +/- one MDL                                                                               | Correct problem then repeat initial continuing calibration verification and re-analyze all samples since last successful calibration blank |
|                            | Continuing calibration verification (CCV)             | Before sample analysis, after every 10 samples, and at the end of the analysis sequence -                   | Analytes within 10% of target value for method 200.8, within 10% for method 6020B                                     | Repeat calibration and re-analyze all samples since last successful calibration verification.                                              |
|                            | Method Blank                                          | Once per analytical batch                                                                                   | No analytes detected within +/- one MDL                                                                               | Correct problem then re-prepare and analyze method blank and all samples processed with the contaminated blank                             |
|                            | Duplicate                                             | One per batch<br>Sample concentration must be 4X MDL or greater for valid results.                          | %RSD must be 20% for water<br>%RSD must be 30% for soil                                                               | Reanalyze duplicate sample.<br>Check system, re-prepare, re-analyze as needed                                                              |
|                            | LCS/LCSD                                              | One per prep batch                                                                                          | 200.8: within 15% of target<br>6020B: within 20% of target                                                            | Re-prepare and analyze the LCS/LCSD and all samples in the affected analytical batch                                                       |
|                            | Dilution test: 1:4 dilution                           | Each preparatory batch<br>Sample concentration must be 20X MDL                                              | Five times dilution sample result must be within 10% of the undiluted sample result for 6020 B or A and 10% for 200.8 | Perform post digestion spike addition                                                                                                      |
|                            | Recovery Test                                         | When dilution test fails or sample concentration < 20X MDL                                                  | Recovery within 25% of target value                                                                                   | Perform method of standard additions                                                                                                       |
|                            | MS/MSD                                                | One per prep batch                                                                                          | All analytes within 20% RPD<br>MS/MSD-200.8: 70-130%<br>MS/MSD-6020B: 75-125%<br>PDS-6020B: 75-125%                   | Check system, re-prepare, re-analyze as needed<br>Sample Conc. > 10X spike Conc., if Not, cannot validate MS                               |
|                            | IDOC                                                  | Every time a new analyst performs the test method for the first time - second source.                       | See LIMS Test code or QC Charts<br>LCS Accuracy for Limits                                                            | Analyst cannot perform the test method until the IDOC passes method criteria                                                               |
|                            | LLOQ                                                  | Initial<br>Quarterly                                                                                        | Spike +35%, RSD <20%<br>Spike +35%, RSD <20%                                                                          | Re-evaluate, repeat study                                                                                                                  |
|                            | MDL                                                   | Initial Blank & Spike MDL Study<br>Quarterly Verification. Annual MDL Study Re verification                 | MDL < Spike Level<br>Analyte specific per test                                                                        | Re verification, repeat study                                                                                                              |
| EPA 608.3 Pest/PCB         | Minimum 3-point initial calibration for all analytes  | Initial calibration prior to sample analysis                                                                | RF = 20%; Linear - least squares regression $r > 0.995$                                                               | Correct problem then repeat initial calibration                                                                                            |
|                            | Second source calibration verification standard (ICV) | Once per five point initial calibration - from second source                                                | All analytes within 20% of target value                                                                               | Correct problem then repeat initial calibration                                                                                            |
|                            | Retention time window calculated for each analyte     | Each day test is performed.                                                                                 | 3 times standard deviation for ea. analyte RT from 72 hour study                                                      | Fix problem then reanalyze samples analyzed since retention time check                                                                     |
|                            | Continuing calibration verification                   | Before sample analysis, after every 20 injections, at the end of analysis sequence - varying concentrations |                                                                                                                       | Fix problem. Repeat initial continuing calibration verification; reanalyze all samples since last successful CCV                           |
|                            | Breakdown check (Endrin and DDT)(1)                   | Daily prior to analysis of samples                                                                          | Degradation <20%                                                                                                      | Inlet column maintenance; repeat breakdown check                                                                                           |
|                            | Method Blank                                          | Once per analytical batch                                                                                   | No analytes detected > PQL                                                                                            | Correct problem, re-prepare and analyze method blank & all samples processed with the contaminated blank.                                  |

| Method                                                                                                                                                                                                                                                                                                      | QC Check                                                                | Frequency                                                                                                     | Acceptance Criteria                                                       | Corrective Action (3,4)                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                                                                                             | LCS/LCSD                                                                | One per prep batch                                                                                            | All analytes within range of method criteria (SOPs/Methods)               | Re-prep and analyze the LCS/LCSD and all samples in the affected batch.                                                      |
| EPA 608.3<br>Pest/PCB                                                                                                                                                                                                                                                                                       | Surrogate Spike                                                         | Every sample, spiked sample, standard, and method blank                                                       | All analytes within range of method criteria (SOPs/Methods)               | Check system, re-inject, re-extract                                                                                          |
|                                                                                                                                                                                                                                                                                                             | MS/MSD                                                                  | Every batch                                                                                                   | All analytes within range of method criteria (SOPs/Methods)               | None - Narrate the results in LIMS                                                                                           |
|                                                                                                                                                                                                                                                                                                             | IDOC                                                                    | Every time a new analyst performs the test method for the first time - second source.                         | All analytes within range of method criteria (SOPs/Methods)               | Analyst cannot perform the test method until the IDOC passes method criteria                                                 |
|                                                                                                                                                                                                                                                                                                             | MDL                                                                     | Initial Blank & Spike MDL Study Quarterly Verification. Annual MDL Study Re verification                      | MDL < Spike Level<br>Analyte specific per test                            | Re verification, repeat study                                                                                                |
|                                                                                                                                                                                                                                                                                                             | Second column confirmation (2)                                          | 100% for all positive results                                                                                 | Same results as primary column analysis                                   | Only report the results that match. Use the highest results                                                                  |
| SM2540C<br>TDS<br>SM2540D<br>TSS                                                                                                                                                                                                                                                                            | Verification standard<br>Single standard<br>(if available)              | Each batch                                                                                                    | All analytes within 10% of target value<br>Flashpoint result 77-82°F      | Repeat test. If results are still not within 10%, report result and narrate in LIMS.                                         |
| SM2540B<br>T. Residue<br>EPA-160.4<br>VS                                                                                                                                                                                                                                                                    | Method Blank                                                            | Once per analytical batch                                                                                     | No analytes detected > PQL                                                | Correct problem, re-prep and analyze method blank and samples processed with the contaminated blank.                         |
| SM2540F<br>Sett Solids<br>SM-2540E<br>SW-1010A<br>Flashpoint                                                                                                                                                                                                                                                | Duplicate                                                               | One per batch<br>Sample concentration must be 2X MDL or greater for valid results.                            | %RSD must be 20% for water and 30% for soil.                              | Reanalyze duplicate sample. If results not within RSD limits, report QC failure in LIMS or flag as non-homogenous for soils. |
| SW1030<br>Ignitability<br>EPA-350.1                                                                                                                                                                                                                                                                         | IDOC                                                                    | Every time a new analyst performs the test method for the first time - second source.                         | See LIMS Test code or QC Charts<br>LCS Accuracy for Limits                | Analyst cannot perform the test method until the IDOC passes method criteria                                                 |
| Ammonia<br>EPA-351.2<br>TKN<br>EPA-353.2<br>NO3/NO2<br>NECi-07-0003<br>NO3/NO2<br>EPA-365.1                                                                                                                                                                                                                 | Five-point initial calibration for all analytes<br>(Excludes BOD, CBOD) | Initial calibration prior to sample analysis                                                                  | RF = 10%<br>Linear - least squares regression<br>r>0.99; ≥0.995 for 9056A | Correct problem then repeat initial calibration                                                                              |
| Phosphorus<br>Sulfate<br>SM4500S2F-2011<br>SW-9034<br>Sulfide<br>SM4500SO3B-2011<br>Sulfite<br>EPA-410.4<br>COD<br>SM5310B<br>SW-9060A<br>TOC<br>EPA-420.1<br>EPA-420.4<br>SW-9065<br>Phenolics<br>SM5540C<br>MBAS<br>EPA-300.0<br>SW-9056A<br>IC<br>Oil & Grease<br>SW-9071B<br>SW-1664B<br>SM5210B<br>BOD | Second source calibration verification standard (ICV)                   | Once per five point initial calibration - from second source.                                                 | All analytes within 10% of target value                                   | Correct problem then repeat initial calibration                                                                              |
|                                                                                                                                                                                                                                                                                                             | Continuing calibration verification                                     | Before sample analysis, after every 10 samples, and at the end the analysis sequence - varying concentrations | All analytes within 10% of target value                                   | Correct problem then repeat initial continuing calibration verification and re-analyze all samples since last successful CCV |
|                                                                                                                                                                                                                                                                                                             | Method Blank                                                            | Once per analytical batch                                                                                     | No analytes detected > PQL                                                | Correct problem then re-prep and analyze method blank and all samples processed with the contaminated blank.                 |
|                                                                                                                                                                                                                                                                                                             | LCS/LCSD                                                                | One per prep batch                                                                                            | See LIMS Test codes                                                       | Re-prep and analyze the LCS/LCSD and all samples in the affected analytical batch                                            |
|                                                                                                                                                                                                                                                                                                             | MS/MSD                                                                  | Every 10 samples (9038)<br>One per prep batch (remainder)                                                     | See LIMS Test codes                                                       | None - Narrate the results in LIMS                                                                                           |
|                                                                                                                                                                                                                                                                                                             | IDOC                                                                    | Every time a new analyst performs the test method for the first time - second source.                         | See LIMS Test codes<br>LCS Accuracy for Limits                            | Analyst cannot perform the test method until the IDOC passes method criteria                                                 |
|                                                                                                                                                                                                                                                                                                             | LLOQ                                                                    | Initial                                                                                                       | Spike +35%, RSD <20%                                                      |                                                                                                                              |

| Method                                                                                                                                       | QC Check                                                | Frequency                                                                                      | Acceptance Criteria                                          | Corrective Action (3,4)                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------------------------------------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| SM5210B<br>CBOD                                                                                                                              |                                                         | Quarterly                                                                                      | Spike +35%, RSD <20%                                         | Re-evaluate, repeat study                                                                                                         |
|                                                                                                                                              | MDL<br>(Excludes BOD, CBOD)                             | Initial Blank & Spike MDL Study<br>Quarterly Verification. Annual<br>MDL Study Re verification | MDL < Spike Level<br>Analyte specific per test               | Re verification, repeat study                                                                                                     |
| SM2310B<br>Acidity                                                                                                                           | Verification standard<br>Single standard (if available) | Each batch                                                                                     | All analytes within 10% of<br>target value                   | Repeat test. If results are still not within<br>10%, report result; narrate in LIMS                                               |
| SM2320B<br>Alkalinity                                                                                                                        | Method Blank                                            | Once per analytical batch                                                                      | No analytes detected > PQL                                   | Correct problem, re-prepare and analyze<br>method blank and samples processed<br>with the contaminated blank.                     |
| Wastewater<br>Coliforms                                                                                                                      | Duplicate                                               | One per batch                                                                                  | %RSD must be 20% for water<br>and 30% for soil.              | Reanalyze duplicate sample. If results not<br>within RSD limits, report QC failure in LIMS<br>or flag as non-homogenous for soils |
| SM9222D<br>F. Coliform                                                                                                                       |                                                         | Sample concentration must be<br>2X MDL or greater for valid results.                           |                                                              |                                                                                                                                   |
| SM9222B<br>T. Coliform                                                                                                                       | IDOC                                                    | Every time a new analyst<br>performs the test method<br>for the first time - second source.    | See LIMS Test code or QC Charts<br>LCS Accuracy for Limits   | Analyst cannot perform the test<br>method until the IDOC passes<br>method criteria                                                |
|                                                                                                                                              | Method Blank                                            | Once per analytical batch                                                                      | No analytes detected > PQL                                   | If method blank is contaminated,<br>reanalyze duplicate sample.                                                                   |
| Drinking Water<br>Coliforms                                                                                                                  | Duplicate                                               | If available                                                                                   |                                                              |                                                                                                                                   |
| F. Coliform<br>SM9223                                                                                                                        |                                                         |                                                                                                |                                                              |                                                                                                                                   |
| T. Coliform<br>SM9221D                                                                                                                       | IDOC                                                    | Every time a new analyst<br>performs the test method<br>for the first time - second source.    |                                                              | Analyst cannot perform the test<br>method until the IDOC passes<br>method criteria.                                               |
| EPA-120.1<br>Conductivity                                                                                                                    | Method Blank                                            | Once per analytical batch                                                                      | No analytes detected > PQL                                   | Correct problem then re-prepare and<br>analyze method blank and all samples<br>processed with the contaminated blank.             |
| Color<br>SM2120F<br>SM2120B                                                                                                                  | Single Standard                                         | Once per analytical batch                                                                      | All analytes within 10% of<br>target value                   | Correct problem then repeat initial<br>calibration                                                                                |
| SM4500H+B-2011<br>pH                                                                                                                         |                                                         |                                                                                                | Conductance and color standard<br>within 5% of target value. |                                                                                                                                   |
| EPA-180.1<br>Turbidity                                                                                                                       |                                                         |                                                                                                |                                                              |                                                                                                                                   |
| SM4500CIG-2011<br>Residual Chlorine                                                                                                          |                                                         |                                                                                                |                                                              |                                                                                                                                   |
| SW-9095B<br>Paint Filter                                                                                                                     | Duplicate                                               | One per batch                                                                                  | %RSD must be 20%                                             | Reanalyze duplicate sample. If results<br>not within RSD limits, report QC<br>failure in LIMS                                     |
| SM4500OH-2016<br>DO                                                                                                                          |                                                         |                                                                                                | pH Duplicates <0.1 pH Units                                  |                                                                                                                                   |
| SW-1311<br>TCLP                                                                                                                              | Method Blank                                            | Once per analytical batch                                                                      | No analytes detected > PQL                                   | Correct problem then re-prepare and<br>analyze method blank and all samples<br>processed with the contaminated<br>blank.          |
| SW-1312<br>SPLP                                                                                                                              |                                                         |                                                                                                |                                                              |                                                                                                                                   |
|                                                                                                                                              | Post extraction duplicate                               | One per batch                                                                                  | %RSD must be 20%                                             | Reanalyze duplicate sample. If results<br>not within RSD limits, report QC<br>failure in LIMS                                     |
|                                                                                                                                              | Post extraction spike                                   | Once per analytical batch                                                                      | See individual test methods.                                 | See individual test methods.                                                                                                      |
| 1. Endrin/DDT breakdown check for 8081B only.                                                                                                |                                                         |                                                                                                |                                                              |                                                                                                                                   |
| 2. Excludes chlordane, toxaphene, and PCB.                                                                                                   |                                                         |                                                                                                |                                                              |                                                                                                                                   |
| 3. Sample data associated with QC non-conformances resulting in high bias may be reported if all target analytes are below reporting limits. |                                                         |                                                                                                |                                                              |                                                                                                                                   |
| 4. In the event that reanalysis is not possible, i.e. no remaining sample, holding times expired, etc., data may be reported with non-       |                                                         |                                                                                                |                                                              |                                                                                                                                   |
| Conformance and its potential effect on the data described in a Case Narrative.                                                              |                                                         |                                                                                                |                                                              |                                                                                                                                   |

## 6.0 SAMPLE BOTTLE AND PRESERVATIVE PREPARATION

- 6.1 EETSE Atlanta does not provide sampling services, therefore, has no sampling plan or procedures. If requested by the client, EETSE Atlanta does provide appropriate pre-cleaned sample containers. The laboratory assumes responsibility for supplying the proper containers and preservatives.
- 6.2 Sample Container Preparation: [Table 3-3 within EETSE Atlanta SOP SR-09002 Sample Receiving](#) contains information for the correct containers needed for each analysis.
  - 6.2.1 A laboratory label and proper preservative are added to the sample bottle prior to shipment or pick-up by the client. Some clients may request several cases of bottles, preservative in separate containers, and separate labels. Should this occur, the client would be responsible for label attachment and the addition of preservatives in the field. If the client performs these duties, this is indicated on the bottle label and the chain of custody.
  - 6.2.2 If contamination is observed in trip blanks, a representative from each “lot” of sample containers may be analyzed for the detected parameter(s) to ascertain the cause.
  - 6.2.3 Bottle contamination checks are typically accomplished by filling the bottle with DI water and analyzing for the analytes in question. If any results are above the reporting level, contamination is present and the source must be found.
    - 6.2.3.1 A typical method of laboratory contamination is the introduction of volatile compounds into VOC vials by the use of extraction chemicals such as methylene chloride. Another means of laboratory contamination is the cross contamination of analytes into reagent bottles through poor analytical techniques. An example would be returning aliquots of reagents to their original containers after use. In this instance, contaminants in the reagents are measured as part of the sample result when the reagent is used in the test. Finally, cross contamination can occur during analysis when glassware that is used for the test is not been properly cleaned between samples.
    - 6.2.3.2 If the analysis indicates that the contamination source is the bottle manufacturer, the vendor or manufacturer must be informed immediately. Use of the affected bottles must stop immediately and another lot of bottles used instead.
    - 6.2.3.3 Methods of eliminating sample contamination are discussed in the individual analyte SOPs.
    - 6.2.3.4 [Procedures for checking sample bottles for sterility and metals contamination are outlined in the Sample Receiving SOP \(Sec. 3.2\).](#)
- 6.3 When the addition of preservatives is performed by laboratory personnel, the preservation type and amount used is marked on the label. This procedure informs the sample collection agent that the sample bottle has pre-measured preservative in it. Additionally, it provides important safety information for the sample collection agent.
- 6.4 Preservatives prepared by the laboratory are documented in a Preparation Standard logbook. The logbook contains the preservative preparation information including the preservative lot number and if the chemical was used “as is” from the manufacturer or if it was prepared in the lab. See Sec. 6.7.
- 6.5 Proper packing of bottles is essential to prevent breakage during shipping. All bottles should be wrapped in bubble wrap and the container, usually a cooler, filled with packing material.
- 6.6 Certain biological analyses require a sterile bottle for sampling. This includes plate counts, E-coli, and Total Coliform analyses. The laboratory purchases sterilized bottles for these analyses. Never break the seal on these bottles or open them as this can contaminate the bottles.

## 6.7 Preservatives and removal of interferences.

6.7.1 There are several preservatives used to increase the holding time for an analysis. In most cases, these preservatives are required by the test method, and are added to alter the sample pH or to remove possible interferences. The preservatives used at EETSE Atlanta include the following:

6.7.1.1 HCl: 1:1 Hydrochloric Acid (2 ml per liter of sample) is added to VOC vials and other sample bottles to lower the resultant pH to  $\leq 2$  after the addition of sample to the bottle.

6.7.1.2 H<sub>2</sub>SO<sub>4</sub>: Concentrated Sulfuric Acid (2 ml per liter of sample) is added to sample bottles to lower the resultant pH to  $\leq 2$  after the addition of sample to the bottle.

6.7.1.3 NaOH: Solid Sodium Hydroxide pellets are added to sample bottles to raise the resultant pH to  $\geq 12$  after the addition of sample to the bottle.

6.7.1.4 HNO<sub>3</sub>: Two ml per liter of sample of a 1:1 Nitric Acid (1 part concentrated Nitric Acid mixed with 1 part DI water) is added to sample bottles to lower the resultant pH to  $\leq 2$  after the addition of sample to the bottle.

6.7.2 Low results can be expected when analyzing for BOD, Volatile Organics, and Pesticides in the presence of chlorine. These samples must be tested for the presence of chlorine. This procedure is performed by placing a sample drop on a starch-potassium iodide paper strip. If the strip turns blue, chlorine is present and treatment is needed. Chlorine removal is accomplished through the addition of sodium thiosulfate (usually 2 – 4 ml of a 0.008% or a 1 N solution). Following the addition of this compound, the destruction of chlorine is verified through a subsequent chlorine check.

6.7.3 Low results can also be expected when analyzing for BOD in the presence of cyanides. Testing for the presence of cyanide is performed by placing a drop of sample on a lead acetate paper strip. If the strip turns black, cyanide is present and treatment is needed. Cyanide removal is accomplished through the addition of ascorbic acid, a few grains at a time, until the paper does not turn black. A few more grains can be added to the sample to ensure cyanide removal.

## 6.8 Bottle Kit Preparation

6.8.1 Number of bottles required per test, type of preservatives, and bottle type are method specific.

6.8.2 [Table 3-3 within EETSE Atlanta SOP SR-09002 Sample Receiving](#) indicates the preservation, holding times, and containers required for the types of tests and matrices analyzed in the laboratory.

## 7.0 CUSTODY OF SAMPLES, EQUIPMENT, AND SUPPLIES

### 7.1 Review of New Work

7.1.1 The Laboratory Manager is primarily responsible for determining the capacity of the facility and its resources to handle new work, although other senior members of management may be called upon to provide expertise and input as needed. This determination consists of a comprehensive appraisal of the client's projected needs. Factors assessed are the ability of the laboratory to comply with the requirements of its accreditations while maintaining the expected level of legal defensibility and analytical validity of all reported data.

7.1.2 Prior to the acceptance of any new requests, tenders, or contracts by EETSE Atlanta the appropriateness of facilities and resources is considered utilizing the information in the following sections. If the facility and/or resources are inadequate to perform the work, the Laboratory Manager may exercise his discretion to refuse to perform all or part of a particular project. The Executive Director of Customer Service will be informed of this decision and the Project Managers will inform the client. The laboratory affords clients cooperation to clarify requests and to monitor the



laboratory's performance in relation to the work performed (while ensuring confidentiality to other clients). Differences between the request and the contract shall be resolved before laboratory activities commence.

7.1.2.1 Facilities. The facility must be suitable for the proper receipt and storage of the number and type of samples proposed to be accepted.

7.1.2.2 Resources.

7.1.2.2.1 Stipulated methods, sample preparations, final reports, data packages, and deliverables are reviewed to determine the availability of suitable instrumentation and personnel.

7.1.2.2.2 The laboratory must be capable of meeting all analytical requirements for the selected test methods. The specified requirements and methods must be adequately defined, documented, and understood.

7.1.2.2.3 The laboratory shall advise and obtain approval from the client before subcontracting work to another laboratory.

7.1.2.3 Contracts

7.1.2.3.1 The methods and procedures selected will meet the customer's requirements.

7.1.2.3.2 The lab informs the customer when requested method is inappropriate or out of date.

7.1.2.3.3 Any differences between the request or tender and the contract shall be resolved before laboratory activities commence.

7.1.2.3.4 Each contract shall be acceptable to both the laboratory and customer.

7.1.2.3.5 Deviations requested by the customer shall not impact the integrity of the laboratory or the validity of results.

7.1.2.3.6 The customer shall be informed of any deviation from the contract.

7.1.2.3.7 If a contract is amended after work has commenced, amendments shall be communicated to all affected parties.

7.1.2.3.8 The laboratory shall cooperate with customers in clarifying requests and monitoring the laboratory's performance in relation to the work performed.

7.1.2.4 Records of Reviews

7.1.2.4.1 Records of Reviews including changes shall be retained.

7.1.2.4.2 Records shall also be retained of pertinent discussions relating to customer's requirements or laboratory activities.

7.1.3 Technical and Management Capability

7.1.3.1 The review of capability must establish that the laboratory possesses the necessary physical personnel, information, and resources to perform the tests in question. Additionally, the laboratory personnel must have the skills and expertise required for performing these tests.

7.1.3.2 The laboratory shall have adequate personnel at all times during the performance of analytical testing to ensure that clients receive data which meets the terms and conditions of the work agreement.



7.1.3.3 The review may consider the results of previous work of a similar nature or, where new testing is being implemented, the results of inter-laboratory testing, trial tests, proficiency samples, MDL studies, etc.

### 7.1.4 Discrepancies

7.1.4.1 Any differences between the request or tender and the capability of the laboratory to fulfill the proposed work are resolved before any testing begins. (The Chain of Custody is used to verify discrepancies because it is a form of contract.)

7.1.4.2 Modifications are allowed upon consent of the client. Changes are documented in the contract prior to acceptance. Each contract shall be acceptable to both the laboratory and the client.

7.1.4.3 Problems encountered during any stage of reviewing the testing are addressed and resolved to the satisfaction of both the laboratory and the client.

### 7.1.5 Records

7.1.5.1 The laboratory maintains any records for the initial review of new work entering the laboratory, including any significant changes in the proposed work plan.

7.1.5.2 Communication logs (telephone calls, on-site visits, meetings, e-mails, etc.) are used to record all pertinent discussions concerning the client's requirements. Logs must include the date, time, brief details of the exchange, resolution of any complaints, and identification of the parties involved.

7.1.5.3 Subcontracted work is described and documented prior to receipt of work from the client.

7.1.6 Once work has been accepted, the Director of Project Management is responsible for setting up the client in the LIMS system, setting up an account with the client, and monitoring the project to ensure that all of the client's requirements are met.

## 7.2 Sample Receipt

7.2.1 The laboratory has defined protocols for receiving samples and for the "logging in" process. These protocols provide information to the analysts regarding requested analyses, holding times, types of preservation, matrices, etc.

7.2.2 Sample Acceptance Policy - The laboratory will accept or reject samples for analytical testing based on presence, absence, or resolution of the required criteria specified for labeling, preservation, documentation, identification, hold time, container type, or volume. If this information is missing or comes into question, a corrective action report will be started to address any nonconformances. Upon completion of the corrective action, it will be determined if the laboratory accepts the samples. Samples will be considered accepted upon final login review. Unaccepted samples will be noted in the project narrative if other samples received meet the requirements.

7.2.2.1 The lab sample acceptance policy outlines circumstances under which sample are accepted and rejected. This policy is available to sample collection personnel and includes the following:

7.2.2.1.1 Documentation shall include sample identification, the location, date and time of collection, collector's name, preservation type, sample type and any comments concerning the samples.

7.2.2.1.2 Client samples should be properly labeled with unique identification. Indelible ink should be used along with water resistant labels.

- 7.2.2.1.3 Sample containers should be suitable for the requested test and the analysis hold time must be adhered to. (See [Table 3-3 within EETSE Atlanta SOP SR-09002 Sample Receiving](#) for Preservation, Hold Time, and Containers required.)
- 7.2.2.1.4 Sufficient sample volume must be available for the requested tests. If the client does not provide enough sample for all the tests, it will be noted on the sample receipt checklist. The project manager will contact the client to determine which tests the lab is to perform on the sample and whether or not the client will provide additional sample for other tests.
- 7.2.2.1.5 If samples show signs of damage, contamination or inadequate preservation, or any other concern, a corrective action must be initiated to determine if samples are acceptable for the requested analysis. Project managers with the assistance of the Director of Project Management, Technical Director, Quality Assurance Manager, or the Laboratory Manager address and close the corrective action by either accepting or rejecting the samples. (Corrective Actions and Nonconformances section 13.0) [Data that does not meet the requirements will be qualified by a statement in the report narrative.](#)
- 7.2.3 Upon receipt, each sample is identified by a laboratory-issued project number and a unique individual sample number. Properly followed, the preceding procedures provide court defensible documentation related to sample release to the lab, proper preservation and handling, and traceability throughout the analytical and reporting process.
- 7.2.4 Samples usually arrive at the laboratory in one of three ways: 1) delivered by carrier (UPS, Federal Express, and Mail), 2) delivered by courier, or 3) delivered by client personnel. In all cases, a document called a “Chain of Custody” (COC) must accompany the samples. This document, supplied by the laboratory to clients, is designed to provide to the laboratory all the necessary information about the client, samples, and which analyses are required. In addition, this document provides evidentiary information indicating who had samples in their possession at any time and when possession was changed. In some instances, the client provides their own chain of custody.
- 7.2.5 Once samples have been relinquished to the laboratory, they are checked for condition including the type(s) of preservation employed (temperature, pH, etc.), correctness of containers, and if the COC has been properly completed and signed.
  - 7.2.5.1 Almost all soil and water matrix samples require a transport temperature of ( $0 - \leq 6^{\circ}\text{C}$ .) The samples should be packed in ice in a thermal container. Typically, an insulated ice cooler is used for sample transportation. The cooler should have a temperature blank included for use as a sample temperature check. The temperature blank is a plastic bottle filled with water.
    - 7.2.5.1.1 Temperature is measured with a calibrated thermometer. The thermometer is individually identified and labeled with its calibration expiration date. The temperature of the blank must always be recorded during the login procedure. If the temperature is outside the  $0 - \leq 6^{\circ}\text{C}$  range, this should be annotated so that the project managers can notify the client.
    - 7.2.5.1.2 Samples that are hand-delivered to the laboratory immediately after collection may not meet these temperature criteria. In these cases, the samples shall be considered acceptable there is evidence that the chilling process has begun (such as arrival on ice).
    - 7.2.5.2 Before placement in the storage area, samples must be checked for integrity. If any bottles are broken or have leaked, the client must immediately be contacted. This is particularly important if there are no duplicates of the sample in order to obtain instructions from the client on how to handle the situation. It may be necessary to re-sample for the incomplete tests.

- 7.2.5.3 Sample labels are checked against the Chain of Custody for accuracy and discrepancies. Custody seals must be intact if used. This procedure is best accomplished by sorting samples by their location rather than by their testing requirements. For example, all samples labeled “MW-1A” are combined and may include VOCs, metals, SVOCs, etc. Make sure that all sample labels match the COC for number of analyses, sample ID, matrix, etc. If a discrepancy is found, the variance is noted on the Sample Receipt checklist and the client is contacted to clarify the problem.
- 7.2.5.4 Samples are checked for type and proper degree of preservation. This only applies to aqueous samples and never to volatile organic samples (VOC samples are checked after the vial has been opened and the sample analyzed). There are several types of preservation required for the different analyses. Most involve either a high or low pH.
- 7.2.5.4.1 To check the sample for pH, take a clean disposable Pasteur pipette and touch its tip to the top of the aqueous surface. Sample should be drawn by capillary action up the tube. Remove the pipette, recap the sample and touch the Pasteur pipette to some pH paper. Read the paper to the nearest pH unit.
- 7.2.5.4.2 Check the preservation chart (Section 6) to see if the pH is in the range required for the sample. If not, notify the Project Manager immediately. The Project Manager may require the addition of proper preservative to the sample. If the holding time is affected by inappropriate preservation, this should also be communicated to the client and analysts through the Project Manager.
- 7.2.5.5 Samples are checked for holding time. Holding times begin the moment the sample is taken, not when it is received. While most analyses have a holding time of several days, holding times vary widely from as little as 15 minutes to as long as 6 months. The time involved in shipment of a sample to the laboratory can greatly reduce the amount of time the analyst has to perform the procedure. It is therefore critical that holding times be noted accurately and the appropriate analyst or manager notified immediately if holding time is running out (less than 24 hours left).
- 7.2.5.6 Results of observations are noted on a “Sample Receipt Check List” at login. (See Procedures within EETSE Atlanta SOP SR-09002 Sample Receiving)
- 7.2.6 Samples are then placed in the sample holding area, either in the appropriate cooler or on the correct shelf. If the project requires a continuous Chain of Custody, they must be logged out of the area by the analyst and logged back in when analysis is completed using the logbook provided. If the sample is completely exhausted, this must be noted in the logbook.
- 7.2.7 Any deviations must be brought to the attention of the client and/or the Project Manager so the client may be contacted for directions on how to proceed. For example, some samples may be unsuitable for testing if the temperature has not been maintained.
- 7.2.8 After all sample information is logged into the computer, a printout of the entered data is made. A second individual must verify the accuracy of the sample information entered. If the log-in, COC, and all sample information are approved, the checking individual initials the work and the project folder is given to the Project Manager.
- 7.2.9 Occasionally, samples require special storage times after the analyses are complete. This should be noted when these samples arrive at the laboratory to avoid them being prematurely discarded. To apprise all affected personnel, annotate this information into LIMS. These samples are to be stored

in the special holding area designated by the Sample Receiving Department. A Project Manager will notify the Sample Receiving Department which samples are required to be placed in this area.

7.2.10 Sample bottles are segregated according to their required analyses. Samples analyzed for volatile organics are placed in a separate cooler/refrigerator from semi-volatile organics or inorganics **due to the possibility** of cross-contamination from inorganic and waste samples. Samples for metal analyses do not require cooling. These samples may be placed on the shelf at room temperature.

7.2.11 Once samples have been removed from a cooler, the cooler must be cleaned before reuse. Usually, rinsing and air drying of the cooler will be sufficient. Make sure to return clients' coolers.

## 7.3 Review of Sample Login

7.3.1 When samples (a project) arrive at the laboratory, a project is created in the laboratory information management system (LIMS) and reviewed by a project manager as discussed in the Section 7.3.3.

7.3.1.1 A "Review of Sample Login" report is filled out by the sample custodian and this report is turned in to the project manager. The project manager reviews the information to ensure that all analyses, sample IDs, etc. are correct.

7.3.1.2 If any problems were found, they are corrected. A copy of the problem and its resolution is transmitted to the Sample Receiving Manager.

## 7.3.2 Sample Receipt Checklist (SRCL)

7.3.2.1 The sample receipt checklist ([Appendix VII](#)) is a list of all information pertaining to the arrival of a project at the laboratory. If any problems are found, such as errors on the chain-of-custody (COC), or any situation does not comply with the procedure or method, such as problems with sample preservation or holding time, the project manager is notified immediately in order to contact the client. The following list represents the questions asked on the SRCL:

7.3.2.1.1 Was the shipping container/cooler in good condition?

7.3.2.1.2 If there were custody seals on the shipping container/cooler, were they intact?

7.3.2.1.3 If there were custody seals on the samples, were they intact?

7.3.2.1.4 Was the container/temperature blank in compliance?

7.3.2.1.5 Was the chain-of-custody present?

7.3.2.1.6 Was the chain-of-custody signed when relinquished and received?

7.3.2.1.7 Did the chain-of-custody agree with sample labels?

7.3.2.1.8 Were samples received in the appropriate containers to perform the requested analysis?  
 If VOA vials were received, were all vials void of headspace?

7.3.2.1.9 Were all sample containers received intact?

7.3.2.1.10 Was sufficient sample volume received to perform requested analysis?

7.3.2.1.11 Were all samples received within the EPA recommended holding times and within the recommended temperature ranges?

7.3.2.1.12 Was turnaround time marked on the chain-of-custody?

7.3.2.1.13 If samples were submitted for volatiles analysis, did they have zero headspace?

7.3.2.1.14 Was the pH acceptable for water samples upon receipt?

7.3.2.1.15 Were samples in good condition?

7.3.2.1.16 Is a known blank included for diffusive samples or AIHA LAP lead analysis?

7.3.2.2 All information at the top of the SRCL, such as client name, date/time received, and carrier name, must also be checked for accuracy. All out-of-compliance and non-conforming events are documented on the SRCL as well as in the PM non-conformance corrective action in LIMS. The client is contacted to discuss the issue or conflict. Resolution, as agreed upon by the client, is documented in the PM corrective action in LIMS and SRCL. Either the Director of Project Management or the Laboratory Manager closes out all corrective actions.

7.3.2.3 In addition, for Drinking Water samples associated with Waster Suppliers, the following Sample Information will be documented for samples where applicable and when available.

7.3.2.1.1 Name of System (PWSS identification number if available)

7.3.2.1.2 Sample Identification (if any)

7.3.2.1.3 Sample Site location

7.3.2.1.4 Sample Type (e.g. routine, repeat, raw or process)

7.3.2.1.5 Date and Time of collection

7.3.2.1.6 Analysis required

7.3.2.1.7 Disinfectant Residual (if available)

7.3.2.1.8 Name of sampler and organization (if not water system)

7.3.2.1.9 Sampler's Initials

7.3.2.1.10 Person(s) transporting sample from system to laboratory  
 (If not sampler), if shipper used, shipping records available

7.3.2.1.11 Any remarks

7.3.3 Procedure for Creating and Reviewing Projects in LIMS  
 (See Procedures within EETSE Atlanta SOP SR-09002 Sample Receiving)

7.4 A Corrective Action Report is generated in LIMS for any sample receiving non-conformance. Section 13 of this Manual describes the Corrective Action Process in detail.

7.5 Health and Safety

7.5.1 All samples should be considered to be hazardous. Until a sample is analyzed, it is impossible to determine what type of contamination is involved. With this in mind, always wear the following safety equipment when handling samples.

7.5.1.1 Safety Glasses: OSHA approved safety glasses must be worn when working with samples. Safety glasses prevent an invasion of the sample into the eye and protect the eyes in case of a sample explosion.

7.5.1.2 Latex Gloves: Latex Gloves must be used when handling samples. Latex gloves protect the hands from the effects of corrosive materials, such as strong acids or bases. In addition, gloves prevent the introduction of hazardous materials into the body by absorption through the skin.



- 7.5.1.3 Sensible Clothing: Long pants and close-toed shoes (no sandals) must be worn at all times while working in the sample receiving area. Many of the samples received by the laboratory are 1 liter or greater in size. A liter of water weighs slightly more than 2 pounds. Dropping a liter of water on an unprotected toe from waist height can fracture the toe. Never wear any clothing that you are not afraid to ruin. Many of the preservatives used in the laboratory are acidic and will eat a hole in most natural materials. If the fiber is man-made, such as nylon, any strong solvent will melt it.
- 7.5.1.4 Lab Coat: Required when in the laboratory or handling samples or chemicals. Not only does it protect your clothing, but it also provides an additional cloth barrier against splashes and spills.

## 7.6 Sample Custody

- 7.6.1 EETSE Atlanta has implemented sample chain-of-custody procedures to provide accurate, verified, and traceable records of sample possession and handling, from sample container shipment through laboratory receipt and sample disposition.
- 7.6.2 Documentation of sample collection, shipment, laboratory receipt and custody is accomplished utilizing a chain-of-custody record. A sample is considered in custody if the following conditions have been met.
- 7.6.2.1 The sample(s) are in the physical possession of the sampler or courier.
- 7.6.2.2 The sample(s) are in view after being in the physical possession of the sampler or courier.
- 7.6.2.3 The cooler(s) or sample bottle(s) are sealed, so that sample integrity is maintained, while in the possession of the sampler or transferee.
- 7.6.2.4 The cooler(s) or sample bottle(s) are in a secured area restricted to authorized personnel.
- 7.6.3 Custody Record Maintenance
- 7.6.3.1 Laboratory records, including copies of the chain-of-custody forms and any associated documentation, are maintained in a secure area with any associated project records.
- 7.6.3.2 Laboratory data are recorded in bound notebooks and entries are made in waterproof ink.
- 7.6.3.3 Laboratory data entry errors are deleted with a single-line through the error. The correction is initialed and dated by the analytical staff member making the change.
- 7.6.3.3.1 Correction tape or other substances designed to obliterate documentation are strictly prohibited in the laboratory and custody areas.
- 7.6.3.4 Laboratory information is documented on prepared forms. All forms for recording laboratory data include a space for the date and for initials that must be completed by the data recorder. Laboratory documentation not recorded on pre-prepared forms is also dated and initialed.
- 7.6.4 The sample custodian, under either routine or special legal chain-of-custody procedures, receives all samples. Legal custody is a special type of sample custody in which all events associated with a specific sample are documented in writing.
- 7.6.5 Laboratory Provided Sample Containers
- 7.6.5.1 Sample containers provided by EETSE Atlanta are manufactured from EPA-designated materials, contain EPA-prescribed preservatives, and are affixed with an EETSE Atlanta identification label.



7.6.5.2 Pre-cleaned sample containers are purchased by EETSE Atlanta. When deemed necessary by the Technical Director, containers from each lot are pre-certified in house prior to use. A lot number is affixed to each container for purpose of traceability.

### 7.6.6 Chain of Custody Documentation, Traceability, and Sample Integrity

7.6.6.1 Formal chain-of-custody procedures are initiated by a sample custodian responsible for the organization and relinquishing of sample containers to the client or field personnel.

7.6.6.2 Properly record all fields of information on the chain-of-custody form. Proper completion of the form is the responsibility of the client's field sampling manager and is required prior to relinquishing the samples.

7.6.6.3 If the site location is different from the client address, the site location is recorded in the "Project Name" space on the chain-of-custody form, or on the right hand side of the form if additional space is required. The sample identifications assigned in the field are recorded in the "Sample Identification" column.

7.6.6.4 Common carriers may identify themselves by signing the "Relinquished By" space on the chain-of-custody form.

7.6.6.5 Maintain chain-of-custody for samples transported from the field to the laboratory by common carrier. Completed custody forms must accompany each sealed cooler by placing them in a plastic bag taped to the inside lid of the cooler.

7.6.6.6 Maintain a copy of each air bill package tracking form associated with a shipment of samples in the appropriate client files.

7.6.6.7 The custody-technician is responsible for the inspection of shipping containers upon laboratory receipt for overall integrity to ensure that the contents have not been altered or tampered with during transit. If tampering is apparent, the sample custodian immediately contacts the assigned project manager who is responsible for notifying the client.

7.6.6.7.1 The cooler inspection form, filed by the sample custodian, describes the deficiency and annotates any corrective action required by the client. Document any appropriate changes on the accompanying project chain-of-custody form, which is dated and signed by the sample custodian or project manager.

7.6.6.8 If shipping containers arrive intact, the sample custodian in the receiving area immediately opens them. The chain-of-custody form and temperature bottle are removed for inspection. Upon receipt, the container temperature is documented in a sample registry or, if requested by the client, documented on the chain-of-custody form.

### 7.7 Continuous Chains of Custody

7.7.1 A "Continuous Chain of Custody" sets protocols for keeping an unbroken, or continuous, chain of custody. The intent of this procedure is to enable EETSE Atlanta employees to track samples from the time and date of receipt to the time and date of disposal, particularly where legal cases are involved. In doing this, a constant record is kept of when and by whom samples are removed from the Sample Receiving Department. EETSE Atlanta will use its standard Chain of Custody (CoC) internally as a "Continuous Chain of Custody" if requested by a client.

7.7.2 Project Managers will notify the Sample Receiving Department when jobs require this unbroken Chain of Custody.

- 7.7.3 A sequential laboratory identification number is assigned to the project and recorded on the chain-of-custody form, on each sample container submitted with the project, and in the Laboratory Information Management System (LIMS).
  - 7.7.3.1 Accurate and complete sample documentation must be provided on the chain-of-custody form in order to log samples into LIMS. The information entered includes all information necessary to maintain chain-of-custody including laboratory ID, client (field) ID, and initials of the sample receipt custodian.
  - 7.7.3.2 Ancillary information, such as sample collection date and requested analyses, is also transferred directly from the chain-of-custody form into the LIMS and appears on the client project-specific acknowledgement.
- 7.7.4 Once the chain of custody is verified, the project is logged into the LIMS to transfer the desired work order request to the laboratory.
  - 7.7.4.1 The sample custodian checks the information on each sample's label against that on the chain-of-custody form for discrepancies.
  - 7.7.4.2 The sample custodian also inspects all samples for leakage or obvious seal (if provided) tampering. All samples are unpacked in a well-ventilated sample receipt area.
  - 7.7.4.3 Samples received in plastic containers, or those that appear to be accumulating or evolving gas, are treated cautiously and inspected under a chemical hood since they may contain toxic fumes or be of an explosive nature.
  - 7.7.4.4 A "Cooler Receipt Form" is completed to document custodial concerns at sample login.
- 7.7.5 Custody discrepancies noted by the sample custodian are transmitted to the project and sample manager and are resolved with the client prior to laboratory work assignment. Discrepancies are documented on the Anomaly Report.
  - 7.7.5.1 The Project Manager and the Sample Custodian attempt to resolve custody discrepancies expeditiously to avoid holding time compromises. After a decision concerning a sample has been made, the Project Manager or Sample Custodian makes an initialed note in the work order narrative. The person, who was notified, time, date, and resolution, if applicable, is documented. This information is also documented on the Sample Custody Excursion form.
  - 7.7.5.2 Email or hard copy of custodial resolutions or project order alterations is secured from the client prior to work initiation. Copies of this documentation are mailed to the client and maintained in the client file.
- 7.7.6 After addition of the project sequential identification number, the samples are distributed to the appropriate sample storage areas. Sample storage temperature logs are maintained for all sample storage refrigerators to assure proper temperature maintenance throughout the analytical process.
- 7.7.7 As soon as possible, all samples received by EETSE Atlanta are checked, by the appropriate preparation or analytical department, for proper pH adjustment. The pH of each sample is measured, documented, and adjusted if necessary. To avoid compromising sample integrity, volatile samples are checked for proper pH adjustment only at the time of analysis. The pH of volatile samples is not adjusted.
- 7.7.8 Only authorized personnel are permitted within the laboratory areas where sample access is possible. Sample storage areas are designed to segregate volatile and non-volatile samples. Standards and extracts are also departmentally controlled and stored separately.

- 7.7.9 The set of analyses required for a group of samples is project-dependent. After sample registry login and verification, samples are transferred from the receiving area to the appropriate sample preparation area. Those samples not requiring preparation are immediately sent to the sample analysis storage area. Using LIMS-generated sample preparation worksheets for guidance, samples are extracted, digested, or distilled as appropriate. The extracts, digestates, or distillates are then transferred to the appropriate analysis section, where analysis is performed.
- 7.7.10 For projects where the client requires in-laboratory custody records, the EETSE Atlanta project manager informs the sample custodian that they need to coordinate custody activities prior to sample receipt. For these samples, staff complete department-specific in-laboratory sample tracking forms. Samples and sample preparations are stored in approved sample storage areas.
- 7.7.11 Sample holding times are tracked via the LIMS. Sample collection dates are routinely entered into the LIMS with all sample logins. This information allows holding times specific to each departmental analysis to be tracked by department managers, supervisors, chemists, and analysts through the use of daily status sheets, reference sheets, and preparation worksheets.
- 7.7.11.1 Date analyzed is recorded via instrument outputs as an integral part of the raw data.
- 7.7.11.2 The date of analysis is entered into the LIMS and compared to the date sampled to validate that holding times were not compromised.
- 7.7.12 Upon completion of analytical work, custody of unused sample portions, extracts, or digests is relinquished to a central secured storage area. Here the samples, digests, or extracts await disposal, which is performed with assistance of the LIMS. The LIMS stores client specific disposal instructions, compiles results from the analyses of composite samples, prepares sample disposal lists, invoices for disposal and sample return costs, and provides a disposal record for all excess samples.
- 7.7.13 By careful assignment of user passwords and file access/lock codes, EETSE Atlanta maintains a high level of data security in the LIMS. Thus, only authorized EETSE Atlanta personnel can access client files to view data. In addition, data entry and editing is restricted to highly trained data management personnel.
- 7.7.13.1 Data may be downloaded in a variety of standard formats including ASCII, spreadsheet, database, and text files, such as \*.ASC, \*.WK1, \*.DBF, \*.TXT, etc.
- 7.7.13.2 Additionally, laboratory data may be formatted to match client-specific requirements. These requirements are defined and agreed upon prior to project commencement.
- 7.7.13.3 Laboratory data is thoroughly reviewed prior to preparation of electronic or disc deliverables. The download process includes electronic and logical error check routines to confirm that the data files delivered are consistent with the client's format and data content needs.
- 7.7.13.4 A signed digitally signed electronic report is provided with diskette deliverables and an electronic and documentation audit trail of each download event are maintained.

## 7.8 Data Security

- 7.8.1 Client information is confidential and should be protected during electronic storage and transmission of results. In order to ensure data integrity and security, all files selected for data downloads are transferred from the LIMS to an isolated PC computer system. Access to downloaded files is then controlled via required matches of employee log-on sequences and confidential passwords. The entire download process is regularly reviewed and maintained by the computer department for system performance.

- 7.8.2 The LIMS manager maintains internal documentation for all LIMS programs. This documentation includes descriptions of any program additions, deletions, or modifications, the dates of revisions, and the initials of the responsible programmer. To verify proper functioning of the program hardware and software, a simulation account is maintained. When hardware or software is modified, the LIMS uses actual data in the simulation account to verify that the modifications are functioning as anticipated. Anti-virus software serves as an additional protective measure.
- 7.8.3 Data is entered into the LIMS through direct instrument interfaces and manual entry of data from the chemists' worksheets. Immediately following data entry, approval sheets are printed with the entered data as it appears in the LIMS. Assistant project managers compare all data on the approval sheets against the chemists' worksheets for data transcription errors.
- 7.8.4 Data worksheets, data approval forms, and final reports are routinely printed for verification and signatures. Hard copies of final reports, field data, chain-of-custody forms, and any ancillary documentation pertinent to the project are kept in a secured storage area and placed chronologically within alphabetically arranged client files.
- 7.8.5 EETSE Atlanta maintains a security policy. Under this policy, all external doors are either visually monitored by EETSE Atlanta staff or kept locked. Visitors are required to sign in. They are accompanied at all times by an EETSE Atlanta staff member.
- 7.9 Container Receipt
- 7.9.1 When the laboratory receives containers, they are entered into the Received Container Logbook. An EETSE Atlanta ID Container number unique to that case of containers is issued. Contamination is checked for in containers that do not include a Certificate of Quality Environmental Compliance.
- 7.9.2 The following is a step-by-step guide for entering all information associated with the container:
- 7.9.2.1 A unique EETSE Atlanta ID # is given to each box of containers. This number is given in numerical sequence by adding one to the previous number.
- 7.9.2.2 Under "Container Description", enter a brief description of the bottle type. Include: bottle size, plastic or glass, clear or amber, preservatives, and pre-cleaned, if noted.
- 7.9.2.3 Enter the date that the containers were received at the laboratory in the "Date Received" box.
- 7.9.2.4 Under "Vendor Name", enter the name of the vendor that the containers were ordered from. The sample-receiving manager has this information.
- 7.9.2.5 Enter the vendor lot number under the "Vendor Lot #" box. This number is found on a vendor provided label on the outside of each case of bottles.
- 7.9.2.6 Under "Date Expires", enter the date that the containers will expire. This date will be one year after the containers were received at the laboratory, unless otherwise stated by the manufacturer.
- 7.9.2.7 Enter the number of containers in each case under the "No. of Containers in Lot" box. This information is found on a vendor provided label on the outside of each case of bottles.
- 7.9.2.8 A Certificate of Quality Environmental Compliance is found inside of each box of glass containers. This information is filed in the sample-receiving department. All plastic containers will be checked for contamination in each new lot that is received by the laboratory. The

EETSE Atlanta lab number will be written in the “Contamination check OK” box. The information for the contamination check will be found in the LIMS system.

7.9.2.9 Enter the initials of the person that received the containers in the “Initials” box.

7.9.2.10 After each case of containers has been properly entered into the Received Container Logbook, the EETSE Atlanta ID # and the expiration date should be written clearly on each case of containers in permanent ink. The containers should then be placed in the for use bottle storage area.

7.9.3 A logbook of records shall be kept in the sample-receiving department. It should be checked periodically by the sample receiving department manager to ensure that it is properly maintained.

### 7.10 Subcontracting to Other Laboratories (See Procedures within EETSE Atlanta SOP SR-09002 Sample Receiving)

#### 7.11 Purchasing Services and Supplies

##### 7.11.1 Procurement Document Control

Vendors of analytical supplies to EETSE Atlanta Inc. are regarded as a resource to and an extension of the laboratory. Standards for quality identified in this document shall be applicable to vendors.

7.11.2 The purpose of the procurement control document is to assure the quality and traceability of procured items (equipment, materials, or services) in instances in which the specifications could affect the quality of the services provided by EETSE Atlanta, Inc. This includes such quality related items as the calibration of instruments by outside laboratories, purchase of standards, subcontracted services, and materials requiring testing before use.

7.11.3 Control of purchased materials, equipment, and services is a system designed to insure products and services conform to the procurement requirements. This system includes provisions for vendor evaluation and selection, objective evidence of quality furnished by the vendor, and examination of products or services upon delivery. Prior to the use of such products and services, documented evidence of conformation to the procurement requirements must be provided. This evidence is maintained in the analytical department office records.

7.11.4 It is the responsibility of the Accounting Department to insure the development and implementation of procedures to control purchased products and services. It is the responsibility of the purchasing agent to specify quality objectives for procured items and services. Purchased materials that fail to meet established criteria are documented by Non-conformance reports issued by the purchaser.

##### 7.11.5 Procedures and Responsibilities

7.11.5.1 It is the responsibility of the purchasing agent to provide assurance, when required, that all applicable regulatory requirements, industry codes, and standards appear with the purchase documentation for the affected services and products.

7.11.5.2 The Purchasing Department retains Purchase Orders for control purposes.

7.11.5.3 Purchased items which do not meet the minimum standards set forth by the purchasing agent are processed according to procedures set forth in Section 13.0, “Corrective Action.”

7.11.5.4 The appropriate manager or supervisor and QA Manager review purchase orders to ensure that quality related services or products meet the criteria of the laboratory’s accreditations.



7.11.5.5 Purchase orders for standard catalog items do not require QA review unless they include thermometers, thermistors, hydrometers, pipettors, or analytical balance weights.

7.11.5.6 Where possible, reference materials (such as calibration standards) are purchased from a supplier that conforms to ISO Guide 34 in combination with ISO/IEC 17025, accreditation by an ILAC recognized signatory. External Calibration services shall, wherever possible, be obtained from providers accredited to ISO/IEC 17025 by an ILAC recognized signatory.

### 8.0 ANALYTICAL PROCEDURES

8.1 Method Sources and supporting procedures include the following:

8.1.1 Analytical methods used are currently accepted and approved by the US EPA, NIOSH, and "Standard Methods".

8.1.2 Other reference procedures for non-routine analyses including methods stipulated by specific states, such as Underground Storage Tank methods, or by ASTM.

8.1.3 [Appendix X](#) includes the list of controlled outside reference documents maintained by EETSE Atlanta. Control and updating of the reference document is completed annually by the Technical Director. Electronic document updates or web links to current revisions are posted to the laboratory portal server library, and [Appendix X](#) is updated with the annual update to the QA Manual.

8.1.4 The laboratory has a procedure (for the AIHA LAP program) in the form of a Standard Operating Procedure (SOP) for the validation of methods in the event a laboratory designed method or a non-standard method is used.

8.1.5 Laboratory Standard Operating Procedures (SOPs) are located on the company's intranet archival system, commonly referred to as the "portal server". These procedures contain the description of the preparation, calibration, analysis and/or verification test procedures.

8.2 Document Control. This section describes the procedures for control and maintenance of documentation through a document control system, which ensures that standard operating procedures, manuals, and reference documents clearly indicate the time period during which the procedure or document was in force. Regardless of which analytical procedures are used in the laboratory, the methodology shall consist of carefully documented Standard Operating Procedures (SOPs) and approved methods which may be periodically modified, updated or replaced entirely due to advances in technology or changes in regulatory protocols. Some clients may require pre-approval of method revisions before modifications are used to generate data. Documentation of analytical procedures for generating laboratory data shall be clear, concise, adequately referenced, and reflect the actual steps employed by the analyst.

8.2.1 Procedures

Methodologies employed in the laboratory are documented by the creation of an SOP. This document provides the analyst with the information necessary to perform the analysis. Every SOP is created in accordance with this QA document. It follows the intent of the method it is patterned after, but provides any additional information essential to the specific instrument instructions, specific quality concerns, etc.

8.2.1.1 If an SOP is not available for a specific analysis, the analyst will follow EPA, Standard Methods, NIOSH, or other regulatory methodology as required. Deviations are not allowed.

8.2.1.2 Before a new method is accepted for routine use, adequate performance must be demonstrated. This includes an MDL study, IDOC, and related QA/QC procedures as required by the method.



- 8.2.1.3 Appropriate management personnel evaluate the merits of all new methods and recommend approval or rejection based on the available data. This committee includes, at a minimum, the Laboratory Manager and Technical Director. If the method is approved, a Standard Operating Procedure is created and the procedure is implemented.
- 8.2.1.4 All analytical procedures must provide documentation so that the complete process used to produce data can be reconstructed.
- 8.2.1.5 All deviations from an approved analytical procedure are authorized and documented by the Technical Director.
- 8.2.2 Changes to an approved procedure require, at a minimum, an Interim Change Notice. A complete revision and re-issuance of the SOP may be required. SOPs are reviewed at least annually.
- 8.2.3 A list of all current SOPs including their review and revision status is maintained electronically on EETSE Atlanta\_server\L\Current SOP\SOP Masterlist. Current SOPs are maintained electronically on the EETSE Atlanta Portal Server in the Technical Management folder. All controlled documents are in "Read Only" format and password protected. The Business Unit Manager, Technical Director and their appointees are the only laboratory employees with edit access to these folders. In addition, a master list of controlled documents is maintained for documents other than SOPs. This includes various forms, software, references, etc. It is located at EETSE Atlanta\_server\L\Current SOP\Documents\_Master\_List\_Non-SOPs.
- 8.3. Instructions and Procedures  
It is the policy of EETSE Atlanta Inc. that all analyses and operations are performed using approved written procedures which are to be available to the personnel conducting the analysis /operation. The procedures assume one of two general formats. These formats are "Temporary Procedures" and "Standard Operating Procedures."
- 8.3.1 Temporary procedures are designed to accommodate the transition from a developing analytical service or method to an established procedure in the most efficient manner. They are less than formal procedures but are adequate to document the procedural treatment of samples. Effective dates and expiration dates are documented. Temporary Procedures, approved by a manager and the Technical Director, can be handwritten procedures and contain at a minimum the following information:
- 8.3.1.1 Health and safety requirements to perform procedure (if necessary).
- 8.3.1.2 Actual analytical method (step by step).
- 8.3.1.3 Materials list (if necessary).
- 8.3.1.4 Reagents (if necessary).
- 8.3.1.5 Calculations needed to perform procedure.
- 8.3.1.6 Reference sources from which procedure was developed.
- 8.3.2 Standard Operating Procedures (SOPs) are a formal treatment of an analytical or administrative procedure. Analytical SOPs shall be generated using nationally recognized procedures and incorporate EETSE Atlanta, Inc., operations and instrumentation. The SOPs are revised as required by the appropriate Managers and are reviewed and authorized for continued use at least annually. Analytical SOPs contain the following information:
- 8.3.2.1 Title, issue date and revision number
- 8.3.2.2 Approval signatures

8.3.2.4 Sample preparation, handling, storage and disposal

8.3.2.5 Definitions

8.3.2.6 Responsibilities

8.3.2.7 Hazards and safety requirements

8.3.2.8 Materials and equipment

8.3.2.9 Standardization and calibration requirements

8.3.2.10 QC sample frequency and performance criteria

8.3.2.11 Operating instructions

8.3.2.12 Example calculations and data sheets

8.3.2.13 References

8.3.3 Administrative Procedures contain the following sections

8.3.3.1 Contents Page

8.3.3.2 Purpose and scope paragraphs

8.3.3.3 Text

8.3.4 Emergency procedures are divided into three sections:

8.3.4.1 Symptoms

8.3.4.2 Immediate actions

8.3.4.3 Subsequent actions

8.3.5 Amendments of Documents by Hand:

8.3.5.1 SOPs are only amended via a permanent or temporary Interim Change Notice (ICN).

8.3.5.2 Spreadsheets, checklists, logbooks, and other documents that are templates which are filled in with data may be amended by a department manager, technical director, QA manager, or laboratory manager's approval. The manager/director should write the change on the document, then initial or sign and date the document.

8.4 Electronic Document Control

The laboratory SOPs are maintained electronically by the Technical Director through the electronic document control system. Hard copy signed originals of the procedures are Maintained by the Technical Director or appointee. Any staff member may request revision to the procedures.

8.5 Creating and Maintaining Standard Operating Procedures

"Standard Operating Procedures" describes the system for preparation, issue, implementation, and revision of formal Standard Operating Procedures for EETSE Atlanta Standard Operating Procedures are defined as written procedures for personnel to perform analyses, technical operations, tests, processes, administrative operations and tasks, or inspection of samples submitted to EETSE Atlanta.

8.5.1 Procedures are tracked, issued, revised, and filed.

### 8.6 Responsibilities

All technical and administrative staff is familiar with the requirements of this procedure and is responsible for its implementation. To ensure uniform and accurate procedures, the following personnel are assigned with the stated responsibilities:

#### 8.6.1 SOP Author - The Author, when writing SOPs ensures the following:

- 8.6.1.1 The SOP meets applicable regulatory requirements.
- 8.6.1.2 The SOP includes the actual instruments and materials associated with EETSE Atlanta, Inc.
- 8.6.1.3 The SOP follows the requirements of the published standard method(s).
- 8.6.1.4 The SOP conforms to guidelines established in this document.
- 8.6.1.5 The SOP meets the applicable requirements of the laboratory's QA Manual.
- 8.6.1.6 That he responds to reviewer(s) comments in a timely manner.

#### 8.6.2 Section Supervisor - The Section Leader is responsible for the following:

- 8.6.2.1 Review all new SOPs originating within their section.
- 8.6.2.2 Ensure the personnel in their department are aware of the SOP and understand their responsibility pertaining to the SOP.

#### 8.6.3 Technical Director - The Technical Director is responsible for the following:

- 8.6.3.1 If a new SOP needs to be created, the Technical Director may assign the task of drafting SOPs to qualified individuals who possess the requisite experience and good communication/writing skills. The Technical Director may elect to write the SOP.
- 8.6.3.2 Ensures SOPs are in compliance with current regulations and established methods.
- 8.6.3.3 Reviews and approves all SOPs.
- 8.6.3.4 With the assistance of the QA Manager, maintains the SOP development, review, approval, and distribution system as stated in this procedure.
- 8.6.3.5 With the assistance of the QA Manager, maintains a protected archive of old SOP versions and current versions (controlled document system) for obsolete SOPs.

#### 8.6.4 Laboratory Manager - the Laboratory is responsible for the following

- 8.6.4.1 Ensures that all sample analyses requested by the client have a current SOP. If a current SOP does not exist, the Laboratory Manager shall initiate a procedure for creation of an SOP.

#### 8.6.5 QA Manager - the Quality Assurance Manager is responsible for the following:

- 8.6.5.1 With the assistance of the Technical Director, assists in SOP development, review, approval, and distribution system as stated in this procedure.
- 8.6.5.2 Ensures SOPs are in compliance with current regulations and established methods.

### 8.7 Definitions

8.7.1 Interim Change Notice (ICN) - A document accompanying any SOP or manual as a mandatory change, but is not included in the original text of the manual or SOP until the next revision.

8.7.2 Controlled Copy - A copy of an EETSE Atlanta Document or SOP that is updated when revisions are issued. All controlled documents are electronic files.

- 8.7.3 Uncontrolled Copy - A printed copy that is labeled “uncontrolled” and is not updated when revisions are issued.
- 8.7.4 Technical SOPs - Any SOP that directly addresses the laboratory analysis procedure.
- 8.7.5 Non-Technical SOP - Any SOP that is used at EETSE Atlanta but does not directly address the laboratory analysis procedures. Examples: QA, QC, Project Management, and Administrative SOPs.
- 8.8 New Procedure Initiation
- 8.8.1 Immediate Procedure Initiation  
A Temporary SOP should be written when the laboratory receives projects which have requests for analytical procedures that do not have an SOP and the staff feels that the laboratory can perform the requested test procedure in-house.
- 8.8.2 Planned Procedure Initiation  
The department manager/section supervisor, the Laboratory Manager, and the Technical Director determine the need for a new SOP.
- 8.8.3 As part of the New Procedure Request Form, the QA Manager and the Technical Director complete the following:
- 8.8.3.1 The Technical Director assigns the appropriate SOP number.
- 8.8.3.2 The Technical Director completes a Draft SOP or assigns an alternate author.
- 8.8.3.3 The draft SOP is forwarded to the affected laboratory personnel for review (see Section 8.11). The draft includes all of the text, tables, and attachments formatted as outlined in this SOP.
- 8.8.3.4 After review by the affected personnel, the Technical Director finalizes the SOP. A hard copy of the SOP is produced for signature and placed into a folder in the QA Managers office. Controlled electronic copies are made available to laboratory staff in “Read Only” format on the EETSE Atlanta Server and Portal Server.
- 8.9 Standard Operating Procedure Formatting
- 8.9.1 Title Page  
Standard Operating Procedure Title Page Format.
- 8.9.1.1 Title - The procedure is given a concise, descriptive title. When appropriate, Operational Procedure titles should include the parameter(s) analyzed, sample type, method (if applicable), and analysis technique description (e.g., “Fluoride in Water by Ion Selective Electrode, based on EPA Method 353.3”).
- 8.9.2 Comments - This section includes any reasons for revisions and additional comments as necessary.
- 8.9.3 Approval Signatures
- 8.9.4 Header
- 8.9.4.1 All SOPs have the following header on each page:
- 8.9.4.2

8.9.4.4 The following recommended header fonts are used:

|                            | Font         | Font Size |
|----------------------------|--------------|-----------|
| <b>EETSE Atlanta, Inc.</b> | Arial – Bold | 12        |
| Address                    | Arial        | 8         |
| SOP No, etc                | Arial        | 9         |

8.9.4.5 Each procedure is uniquely identified by a five digit number preceded by one of the following identifiers to indicate the type of procedure:

| Identifier | SOP Type                   | # Assignments |
|------------|----------------------------|---------------|
| QA         | Quality Assurance          | 01000 – 01999 |
| AD         | Administrative             | 02000 – 02999 |
| HS         | Health & Safety            | 03000 – 03999 |
| EM         | Emergency                  | 04000 – 04999 |
| QC         | Quality Control            | 05000 – 05999 |
| PM         | Project Management         | 06000 – 06999 |
| GL         | General Laboratory         | 08000 – 08999 |
| SR         | Sample Receiving           | 09000 – 09999 |
| OA         | Organic Analytical         | 11000 – 11999 |
| IA         | Inorganic/Metal Analytical | 13000 – 13999 |
| LP         | Leaching Procedure         | 14000 – 14999 |
| MB         | Microbiology               | 15000 – 15999 |
| ABS        | Asbestos                   | 01000 - 01999 |
| WM         | Waste Management           | 17000 - 17999 |

8.9.4.6 Revision - The first issue of a procedure is not assigned a revision number. It is assigned an “N/A” entry. As revisions are made to the procedure, the revision number is increased sequentially starting with Revision 1 (one).

8.9.4.7 Effective Date - The date when the procedure becomes effective. Use following format: 12/97.

8.9.4.8 Revision Date - Date the current revision became effective. Use the following format: 12/97.

8.9.4.9 Number of Pages - The correct form for this is, Page No.: x of y. Example the fifth page of a 24 page document would be formatted as: Page No.: 5 of 24.

## 8.10 Table of Contents

Section and sub-sections are listed in the Table of Contents using the font in the body of the SOP. See Attachment 3 for an example of an SOP. In addition, all Tables and Attachments are included in the Table of Contents.

8.10.1 Each Manual has a Table of Contents that includes the following information: SOP document number(s), name(s) of the SOP, date(s), revision number(s), and associated Method Number. When SOPs are revised, this list is edited to reflect the changes.

8.10.1.1 The Title of each SOP is Centered, All Capital letters, and in Boldface type on the Table of Contents page.

## 8.10.2 SOP Body - Technical Procedures.

8.10.2.1 All procedures are formatted using this section numbering system:

|         |                           |
|---------|---------------------------|
| 1.0     | <u>SECTION</u>            |
| 1.1     | Sub-Section               |
| 1.1.1   | Sub-Sub-Section           |
| 1.1.1.1 | Sub – Sub – Sub – Section |
| 2.0     | <u>SECTION</u>            |

8.10.2.2 To keep all the SOPs uniform, use Arial Font Size 12 for the document.

8.10.2.3 Each Section is underlined and all capital letters.

8.10.2.4 Copies of forms or logbook pages used in conjunction with the SOP and unique to the SOP are attached as Tables or Attachments; sequentially numbered and referenced in the body of the SOP.

8.10.3 All Technical SOPs include the following sections in the same order:

TABLE 8-1 Technical SOPs

| Section Number – Title                                        | Purpose                                                                                                                                                 | Required Information                                                                                                                                                                                                                                                                   |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <u>1.0 SCOPE AND APPLICATION</u>                              | - Describes what the method does<br>- Describes the matrices to which a method applies.<br>-May also describe when the method is to be employed.        | 1. All matrices which may be analyzed using the method.<br>2. Analytes the method is capable of quantifying.<br>3. Quantitation range of analytes.<br>4. Reference to sample                                                                                                           |
| <u>2.0 SUMMARY OF METHOD</u>                                  | Provides a brief description of the procedure and the type of chemistry / instrumentation employed by the laboratory in performing the method.          |                                                                                                                                                                                                                                                                                        |
| <u>3.0 INTERFERENCES</u>                                      | List most common interferences which affect performance of the method. For preparative methods, include interferences which affect the sample analysis. |                                                                                                                                                                                                                                                                                        |
| <u>4.0 SAMPLE COLLECTION, PRESERVATION, AND HOLDING TIMES</u> | List preservation, storage, and holding time requirements for each matrix listed in Section 1.0.                                                        | 1. Preservatives<br>2. Holding Times<br>3. Acceptable container types.                                                                                                                                                                                                                 |
| <u>5.0 REAGENTS AND STANDARDS</u>                             | List all reagents and standards.                                                                                                                        | 1. Purity of reagents.<br>2. All concentrations of reagents and standards required.<br>3. Detailed preparation instructions for each reagent and standard to include initial concentration(s), aliquot volume(s) or weight(s), final volume, final concentration(s), expiration dates. |



|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 4. Listing of the Vendor(s) used to purchase the reagent including the catalog number, vendor address, and telephone number.                                                                                                                                                                                                                                                                                                                                                                                                           |
| <u>6.0 APPARATUS AND MATERIALS</u>        | List all apparatus, materials, and equipment, inclusive of data collection and reduction systems.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | List make and models or equivalents that might be used in the laboratory                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <u>7.0 PROCEDURE</u>                      | <ol style="list-style-type: none"> <li>1. This section defines the analytical procedure from start to finish.</li> <li>2. Address QA/QC requirements when they are appropriate in the overall sequence of activities.</li> <li>3. Addresses specific record keeping requirements (i.e. when and where to record specific information in run logs and other required laboratory documentation).</li> <li>4. Includes the handling and disposal of waste when appropriate in the overall sequence of activities.</li> <li>5. Calculations are included in the text where applicable following the example of SW-846 methods.</li> </ol> | <p>Includes at a minimum:</p> <ol style="list-style-type: none"> <li>1. Instrument set-up and conditions.</li> <li>2. Calculations of retention times if applicable.</li> <li>3. Initial calibrations.</li> <li>4. Continuing calibrations</li> <li>5. Analysis sequence, including QC requirements.</li> <li>6. Calculations – inclusive of conversions for solids.</li> <li>7. Units required for reporting.</li> </ol>                                                                                                              |
| <u>8.0 QUALITY ASSURANCE REQUIREMENTS</u> | Defines additional QA requirements which must be met in addition to all criteria previously listed in the SOP.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <p>Includes a minimum:</p> <ol style="list-style-type: none"> <li>1. Blank requirements.</li> <li>2. Laboratory Control Sample (LCS) requirements.</li> <li>3. Matrix spike requirements</li> <li>4. Matrix spikes duplicate or sample duplicate requirements.</li> <li>5. Any method specific requirements (e.g. MSA for GFAA metals, surrogates for GC/MS procedures, tracers for alpha spectroscopy methods).</li> <li>6. Corrective actions required when requirements are not met.</li> <li>7. Frequency of QC samples</li> </ol> |
| <u>9.0 HEALTH AND SAFETY</u>              | Details specific health and safety requirements for the method and references any general health and safety requirements which may apply.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <ol style="list-style-type: none"> <li>1. Protective clothing required.</li> <li>2. Special hazards associated with chemicals or equipment used in the procedure.</li> <li>3. Storage and / or disposal of all sample extracts and chemicals used.</li> </ol>                                                                                                                                                                                                                                                                          |
| <u>10.0 DATA REPORTING</u>                | Defines the method for data reporting by the staff to clients.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <p>Includes a minimum:</p> <ol style="list-style-type: none"> <li>1. Reporting limits in LIMS.</li> <li>2. Rounding of data.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                |

|                                    |                                                                                       |                                                                                                                                            |
|------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <u>11.0 FILE MAINTENANCE</u>       | Defines the procedures for data transfer and archiving of data for long term storage. | 1. Frequency of data transfer from local computer to server.<br>2. Method used to transfer data to server.<br>3. Data storage requirements |
| <u>12.0 INSTRUMENT MAINTENANCE</u> | Defines the procedures for routine instrument maintenance and entry into logbooks.    |                                                                                                                                            |
| <u>13.0 METHOD PERFORMANCE</u>     | Describes the acceptance criteria published in the method.                            | 1. Spike, duplicate precision and accuracy.                                                                                                |
| <u>14.0 POLLUTION MANAGEMENT</u>   | Describes the procedures required to dispose of hazardous wastes.                     | 1. Waste disposal from received samples.<br>2. Waste disposal from laboratory generated wastes.<br>3. Required forms to be completed.      |
| <u>15.0 DEFINITIONS</u>            | Provides a definition for terms that are used in the SOP.                             |                                                                                                                                            |
| <u>16.0 REFERENCES</u>             | Provides the source(s) of the information from which the SOP was derived.             |                                                                                                                                            |
| <u>17.0 VALIDATION DATA</u>        | Provides the location of information for method validation data.                      |                                                                                                                                            |

Note: The author may add any subsections that are necessary and do not fit in any of the above categories.

## 8.11 SOP Body - Non - Technical (Administrative)

8.11.1 See Sections 8.10 and 8.11

8.11.2 The author may add any subsections that are necessary.

8.11.3 Copies of any forms or logbook pages used in conjunction with and unique to the SOP are attached as Tables or Attachments, sequentially numbered, and referenced in the body of the SOP.

8.11.4 SOP Body - Immediate SOP (See section 8.8.6 for the definition of “Immediate SOP”).

8.11.5 Copy the Regulatory Method

8.11.6 Attach a procedure title sheet

8.11.7 Complete the following sections: 1.0 Health and Safety, 2.0 Reagents and Supplies, and 3.0 Step by Step Procedure. If these sections are included in the regulatory method, the following note can be included under each section: “See Regulatory Method attached section\_\_\_\_\_”.

8.11.8 This is forwarded to the QA Manager who then initiates a new procedure, as described in 8.2.3.

## 8.12 Procedure Review And Revision

Procedures undergo periodic review and are updated whenever regulatory, programmatic requirements or internal process change.

## 8.13 Technical Review

8.13.1 A technical review of the draft SOP is performed by affected laboratory personnel and addresses the following items:

- 8.13.1.1 Does the SOP comply with the technical requirements of the regulatory agency (EPA, USACE, etc.) method?
- 8.13.1.2 Does the SOP state the step by step procedure of how EETSE Atlanta completes the procedure?
- 8.13.1.3 Does the procedure formatting follow the procedures outlined in this section?
- 8.13.2 Comments are written directly on the Draft SOP or on another sheet of paper if needed.
- 8.13.3 The reviewer(s) discuss comments with the Technical Director and arrive at a finalized document.
- 8.13.4 The Technical Director makes the necessary changes electronically. The changes include any Interim Change Notices (ICNs) that have been generated for the SOP and are incorporated as stated in the ICN. The electronic copy is stored in the server in the appropriate year labeled folder.
- 8.13.5 The reviewed SOP is printed and all approval signatures are obtained on the original hard copy.
- 8.13.6 The approved SOP is electronically placed in the “Current Revisions” folder by the Technical Director. All employees have access to these files in a “read only” format.
- 8.13.7 SOP Acknowledgement forms (Attachment 1) are distributed to all area supervisors to distribute to all employees who will be using the procedure.
- 8.13.8 Employees using the new procedure sign SOP Acknowledgement forms and return them to their Supervisor who forwards them to the Technical Director for final approval and scanning.
- 8.14 Procedure Changes
  - 8.14.1 Analysts, supervisors, or management have the ability to request changes to procedures as part of the continuing procedure maintenance using the “Interim Change Notice” (ICN) form (See Attachment 2).
  - 8.14.2 To complete an ICN, make the required changes to a copy of each affected procedure page. Revise and edit these copies using appropriate standard editor’s marks and symbols.
  - 8.14.3 The employee requesting the change ensures the department manager signs the ICN and forwards the ICN to the Technical Director.
  - 8.14.4 The Technical Director signs the ICN, supplies a copy to each applicable department supervisor, ensures that a copy is placed in the controlled SOP folders (see section 8.2), and files it with the controlled QA SOP files.
- 8.15 Standard Operating Procedures Electronic Document Control Process
  - 8.15.1 All controlled documents are electronic files which are password protected and managed by the Technical Director or designee.
  - 8.15.2 All laboratory personnel have access to a controlled, electronic copy of the SOPs applicable to their job description.
  - 8.15.3 Only uncontrolled documents are issued to clients.
  - 8.15.4 The electronic document control files are arranged such that laboratory personnel have access to only current revisions of controlled documents. All archived revisions, draft procedures, etc. are accessible only to authorized QA or Technical Direction personnel via password access.
- 8.16 Uncontrolled copies of Standard Operating Procedures are printed, working copies of the documents, and in that regard, are not monitored or tracked.

#### 8.17 Procedure Archive

The Technical Director is responsible for archiving any procedures that are no longer used at EETSE Atlanta.

8.17.1 Historic hardcopies of SOPs not in use are kept in the Technical Director's office. For SOPs associated with AIHA LAP accreditation, the documents are marked "Void" so it is clear they are not in use.

8.17.2 Retired electronic SOPs related to the AIHA LAP are marked as "Obsolete" via a watermark. All electronic SOPs are moved by the Technical Director to the designated archive directory.

8.17.3 Technical Director removes the folder from the "active" files and places it in the archived files.

#### 8.18 Temporary Change

Temporary changes to an SOP may be required for the following reasons: a sample matrix does not permit the SOP steps to be followed as written, or if a client desires a change to an SOP that is currently in use at EETSE Atlanta.

8.18.1 The Temporary Change Notice is completed and approved prior to the use of a revised procedure. See Attachment 2.

## Attachment 1

QUALITY ASSURANCE MANUAL  
STANDARD OPERATING PROCEDURE  
ACKNOWLEDGEMENT

Name (Printed): \_\_\_\_\_

SOP Title: Quality Assurance ManualSOP Number: QA-01000 Rev. No. 30

The laboratory analyst signature on this approved SOP signifies the following: The analyst has read the SOP in its entirety and has read the analytical methods referenced in the SOP.

The analyst understands that the SOP is to be followed explicitly. Any deviation from the SOP must be noted in writing. Furthermore, the deviation from the SOP must be approved in writing by the laboratory supervisor and the QA staff prior to the analyst's adoption of the deviation from the SOP.

The controlled electronic copy of this SOP is located on the portal server at: Documents: Quality Assurance: QA Manuals: QA Manual: [2024\\_QA\\_Manual\\_Rev\\_30.pdf](#). If a hard copy is desired, you may request one from the Manager/Supervisor.

*Do not make a copy or print out the QA Manual yourself. Printed copies are uncontrolled documents.*

Print Name: \_\_\_\_\_

Date: \_\_\_\_\_

Analyst's Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Department Manager Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Technical Director's Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## Attachment 2



Environment Testing

Atlanta  
3080 Presidential Drive  
Atlanta, GA 30340

### Temporary SOP or Interim (Temporary or ☒ Permanent) Change Notice (circle one as appropriate)

Date:

Employee Requesting Change:

SOP Number:

Reference Method Number:

SOP Title/Rev:

Permanent Change Requested:

#### Approvals (Signature/Date)

Technical Director

Date

Laboratory Director

Date

Quality Assurance Manager

Date

Department Manager

Date



## 9.0 CALIBRATION PROCEDURES AND FREQUENCY

### 9.1 Identification and Control of Materials, Parts and Components

General. Materials, components or items that are used directly in the production of samples or data that, if not controlled, could jeopardize data quality must be identified.

#### 9.1.1 Traceability of Measurement Policy (for AIHA LAP and other accreditations)

Under EETSE Atlantas' various accreditations (i.e. AIHA LAP accreditation), the laboratory shall demonstrate, when possible, that calibrations of critical equipment and hence the measurement results generated by that equipment, relevant to their scope of accreditation, are traceable to the SI (International System of Units) through an unbroken chain of calibrations.

- 9.1.1.1 External Calibration services shall, whenever possible, be obtained from providers accredited to ISO/IEC 17025 by an ILAC recognized signatory, a CIPM recognized National Metrology Institute (NMI), or a State Weights and Measures Facility that is part of the NIST Laboratory Metrology Program. Calibration certificates shall be endorsed by a recognized accreditation body symbol or otherwise make reference to accredited status by a specific, recognized accreditation body, or contain endorsement by the NMI. Certificates shall indicate traceability to the SI or reference standard and include the measurement result and if available the associated [measurement uncertainty](#).

If externally provided products and services that affect laboratory activities or are used to support the operation of the laboratory are necessary, the laboratory will ensure they are suitable. When such products and services are intended for incorporation into the laboratories own activities, they are provided directly to the customer by the laboratory, as received from the external provider.

- 9.1.1.2 Where traceability to the SI is not technically possible or reasonable, the laboratory shall use certified reference materials provided by a competent supplier, or use specified methods and/or consensus standards that are clearly described and agreed to by all parties concerned. A competent supplier is an NMI or an accredited reference material producer (RMP) that conform with ISO Guide 34 in combination with ISO/IEC 17025, or ILAC Guidelines for the Competence of Reference Material Producers, ILCA G12. Conformance is demonstrated through accreditation by an ILAC recognized signatory.

- 9.1.1.3 Reference materials shall have a certificate of analysis that documents traceability to a primary standard or certified reference material and associated uncertainty, when possible. Where possible, reference materials such as calibration standards should be purchased from a supplier that conforms to ISO Guide 34. When applicable, the certificate must document the specific NIST SRM® or NMI (National Metrology Institute) certified reference material used for traceability.

Calibrations performed in-house shall be documented in a manner that demonstrates traceability via unbroken chain of calibrations regarding the reference standard/material used, allowing for an overall uncertainty to be estimated for the in-house calibration.

Calibration shall be repeated at appropriate intervals, the length of which can depend on the uncertainty required, the frequency of use and verification, the manner of use, stability of equipment, and risk of failure considerations. Table 9-1 provides minimum frequencies.

Periodic verifications shall be performed to demonstrate the continued validity of the calibration at specific intervals between calibrations. The frequency of verifications can be dependent on the uncertainty required, the frequency of use, the manner of use, stability of the equipment, and risk of failure considerations. Internal calibrations and verifications are performed at the stated frequencies in Table 9-1. Reference thermometers, hygrometers, and masses, will be repurchased at the stated frequency rather than recalibrated. This has been determined to be more cost effective.

The laboratory has procedures describing their external and internal calibration and verification activities and frequencies, and the actions to follow if equipment is found to be out of acceptable specification. Laboratory staff performing in-house calibration and verifications shall have received documented training.

- 9.1.1.4 Standard tracking: Standards and reagents are tracked in the LIMS chemical inventory system for traceability and auditing purposes. The method of standard and reagent tracking is outlined in the subsequent sections.
  - 9.1.1.4.1 When a standard or reagent is needed that is not already on the approved vendor / materials order list, supervisors forward purchase requests to the Technical Director and / or Laboratory Manager for approval. The standard or reagent is ordered from a reputable supply house (EETSE Atlanta typically uses VWR).
  - 9.1.1.4.2 The information supplied to the Technical Director and / or Laboratory Manager must have the supplier standard or reagent name, order number, size or amount of each unit, grade or purity, price, if possible, and quantity. Upon receipt, supplies (and services) are reviewed to ensure they comply with requirements. When a vendor has been approved for services, a note is placed in the comments field of the Vendors database within LIMS.
  - 9.1.1.4.3 When the standard or reagent arrives, it is logged into the LIMS, usually by the department supervisor or by the sample custodian. All reagents and standards received are electronically tracked and documented by computer via the Laboratory Information Management System.
  - 9.1.1.4.4 Each standard or reagent is given a unique chemical inventory number upon receipt. The next available number in the LIMS is automatically assigned, starting with #5001. The computer entry is completed by entering the correct information in the required fields.
    - 9.1.1.4.4.1 The expiration date for neat standards and reagents is determined using the manufacturer's expiration date, if available. Otherwise, a 1 year expiration date is assigned to volatile organic compounds and standards and 5 year date for acids, dry chemicals, solvents, reagents, and other chemicals. Each standard and reagent is clearly and permanently labeled with its expiration date in indelible ink. The assigned expiration date for intermediate standards will not exceed the manufacturer's expiration date of the stock standard.
    - 9.1.1.4.4.2 Secondary standard containers are labeled with the corresponding LIMS tracking number of the source material, the date the contents were prepared, the six month expiration date, the name of the analyte(s), the concentration of each component of the solution, the matrix and the initials of the person who prepared it.
    - 9.1.1.4.4.3 The chemical inventory number must appear on both the standard and reagent container, and the upper, right-hand corner of the certificate of analysis. It must also be included, if applicable, in standard/preparation, analyses or sample preparation log books.

- 9.1.1.4.4.4 Secondary standard labels **must** include **at minimum**: the LIMS chemical inventory number **and expiration date**. **If space is available, secondary label shall also include all of the following**: the LIMS chemical inventory number, standard name, intended use (spiking, surrogate, reference, or calibration solution), concentration with units, matrix, expiration date, and initials of the person who prepared **the standard**. As long as **all of the aforementioned information** is available, all other information can be found in the LIMS.
- 9.1.1.4.4.5 Spiking, surrogate, reference and calibration solutions and calculations are recorded in the appropriate “Standard/Preparation Log Book.” Logbooks cover the following areas: Organics, Organics Preparation, Semi-Volatile Organics, Microbiology, Metals, Mercury & Wet Chemistry.
- 9.1.1.4.4.6 Some containers such as standards containers for organics are small and there may not be enough room to list all of the required information on the container. Should this occur, it is permissible to attach a label to the bottle.
- 9.1.1.4.4.7 When a standard or reagent is added to a sample for any reason, the LIMS chemical inventory number of that standard or reagent and the amount added must be recorded in the appropriate logbook. For example, if a stock standard MET #33-89-5431 of 1000 mg/L is diluted to 100 µg/L, the following line is entered: 1 ml MET #33-89-5431 to 100 ml DI water, 1 ml of 100x to 100 ml DI water, final conc. = 100 µg/L. (NOTE: “MET #33-89-5431” = Metals Department Standard/ Preparation Log Book 33, page 89, LIMS Chemical Inventory Number 5431).
- 9.1.1.4.4.8 If the standard is used as a stock standard and aliquots of it are diluted to produce working standards, the stock standard’s LIMS chemical inventory number is used. The standard concentration or a designator such as “1” or “A” is used to differentiate between each serial dilution.

Table 9-1  
Minimum Calibration / Verification Frequency Requirements (for AIHA LAP and other accreditations)

| Reference Standard / Equipment | Calibration Frequency                  | Verification Frequency |
|--------------------------------|----------------------------------------|------------------------|
| Balances                       | Initial and Annually                   | Each day of use        |
| Mechanical Pipettors           | Initial and when verification fails*   | Quarterly              |
| Reference Thermometers         | Initial and every 5 years**            | Not applicable         |
| Reference Hygrometers          | Initial and every 5 years**            | Not applicable         |
| Digital Thermometers           | Initial and when verification fails*   | Quarterly              |
| Alcohol-Hg-Spirit Thermometers | Initial and when verification fails*   | Semi-annual            |
| Reference Masses               | Initial and every 5 years**            | Not applicable         |
| Stage Micrometer               | Initial, if damaged, and every 7 years | Not applicable         |

\*Verified internally.

\*\*These reference standards will be repurchased instead of recalibrated in-house.

## 9.1.2 Control of Materials, Parts and Components

When appropriate, identification of each item is maintained by part number, serial number, or other appropriate methods, either directly on the item, or by labels or records traceable to the item. The system is designed to prevent the use of incorrect or defective items and to maintain identify and control inventory. When appropriate, the system controls items by batch number rather than by individual item. Instrumentation not currently in use or equipment undergoing repair is labeled as “Out of Service.”

### 9.1.3 Handling, Storage and shipping

#### 9.1.3.1 General

This criterion establishes requirements for the proper handling, storage, preservation and shipping of materials, supplies and equipment.

#### 9.1.3.2 Procedures and Responsibilities

All items affecting quality are handled and stored in such a manner as to prevent deterioration and damage to the quality. Items that require shipping are packed to prevent damage. Managers and supervisors are responsible for items under their control.

### 9.1.4 Procurement Document Control

#### 9.1.4.1 General

9.1.4.1.1 Vendors of analytical material supplied to EETSE Atlanta are regarded as a resource to, and an extension of the laboratory organization. The standards for quality identified in this document shall be applicable to vendors.

9.1.4.1.2 The purpose of the procurement control criterion is to ensure the quality and traceability of procured quality related items (equipment, materials, or services), whose specification could affect the quality of the services of EETSE Atlanta. This includes such quality related items as the calibration of instruments by outside laboratories (when appropriate), purchase of standards, subcontracted services and materials requiring testing before use, as determined by the QA Manager.

#### 9.1.4.2 Procedures and Responsibilities

9.1.4.2.1 It is the responsibility of the purchasing agent to provide assurance, when required, that all applicable regulatory requirements, industry codes and standards appear in the purchase documentation for affected services and products.

9.1.4.2.2 The Purchasing Department retains purchase orders for control purposes.

9.1.4.2.3 Purchased items which do not meet the minimum standards set forth by the purchasing agent are processed according to procedures set forth in Section 13, "Corrective Actions."

9.1.4.2.4 The appropriate Manager/Supervisor and QA Manager review purchase orders, which may affect quality-related services or products.

9.1.4.2.5 Purchase orders for standard catalog items except those described herein, are exempt from QA review.

### 9.1.5 Non-conformance

The purpose of this criterion is to establish a system to control materials, parts, or components that do not conform to established requirements in order to prevent their inadvertent use. When significant deficiencies in analytical procedures, materials or components has or may lead to the release of incorrect analytical results to the customer, a Corrective Action Report (CAR) is issued.

#### 9.1.5.1 Procedures and Responsibilities

The Laboratory Manager and the purchaser perform the inspection of the newly received material and equipment. Nonconforming items that fail incoming receipt inspection are identified and segregated until disposition is determined and documented by the Non-Conformance Report. Copies of these documents are maintained by the Purchasing Department or the QA Department, as applicable.

## 9.2 Instrumentation List

The laboratory maintains an Equipment List spreadsheet of all instrumentation used. The information documented in this spreadsheet includes a unique EETSE Atlanta ID number for each piece of equipment along with type of instrument, manufacturer, model, serial number, software and revision number, firmware, and date received. It also lists in-house standards of traceability such as certified analytical balance weights and calibration thermometers.

In addition, the item, model, serial number, date received, and the date placed into service. Appendix III, "Equipment List," is a summary of the laboratory equipment spreadsheet (For the complete information see the Equipment List spreadsheet).

## 9.3 Measurement Traceability and Calibration / Procedures for achieving Traceability of Measurements

### 9.3.1 General

The purpose of this criterion is to assure that instruments and other measuring and testing devices used in activities affecting program quality are properly controlled, calibrated and adjusted at specified periods to maintain accuracy within design and/or procedure limits. Implementation procedures consist of the following as applicable:

#### 9.3.1.1 Identification and control of the item

9.3.1.2 Creation of calibration schedules and procedures based on instrument type, planned use, and design limits and program requirements.

9.3.1.3 Development of calibration sources for use in confirming successful equipment operation.

9.3.1.4 Maintenance of equipment history records to indicate past and status, and to provide reproducibility and traceability of results.

### 9.3.2 Responsibility

Under the direction of the manager, the supervisors are responsible for the quality of measuring and test equipment under his/her control and for the maintenance of records of calibrations and checks.

### 9.3.3 General Requirements

All measuring operations and testing equipment having an effect on the accuracy or validity of tests shall be calibrated and/or verified before being put into service and on a continuing basis. The laboratory has an established program for the calibration and verification of its measuring and test equipment. This includes balances, thermometers and control standards.

### 9.3.4 Traceability of Calibration

9.3.4.1 The overall program of calibration and/or verification and validation of equipment ensures that, wherever applicable, measurements made by the laboratory are traceable to national standards of measurement.

9.3.4.2 Calibration certificates indicate the traceability to national standards of measurement and provide the measurement results and associated [measurement uncertainty](#). Certificates are maintained in the Quality Assurance office files.

9.3.4.3 The laboratory maintains calibration certificates that provide traceability to each standard chemical used within the laboratory. As these standards are purchased, the certificates that accompany the standards are stored in logbooks. Information included in the logbooks includes labels provided by the manufacturer, expiration date, lot number, etc. This information is stored separately for standards purchased by each department and can be accessed by all personnel within the department.



9.3.4.4 Where the traceability of national standards of measurement does not apply, EETSE Atlanta shall provide satisfactory evidence of correlation of results by participation in a program of inter-laboratory comparisons, proficiency testing studies or independent analysis.

### 9.3.5 Reference Standards

9.3.5.1 Reference standards, as Class 1 weights or traceable thermometers, are used for calibration only and no other purpose, unless it can be demonstrated that their performance as reference standards will not be invalidated. EETSE Atlanta, Inc., maintains certified Class 1 weights, thermometers which have been calibrated by outside agencies that can provide traceability to national standards of measurement. The stage micrometer will be calibrated by a NIST traceable reference.

9.3.5.2 The calibration and verification of reference standards occurs every five years for Class 1 weights and thermometers and every seven years for stage micrometers.

9.3.5.3 Where relevant, reference standards and measuring and testing equipment shall be subjected to in-service checks between calibrations and verifications. These reference materials shall, where possible, be traceable to national or international standard reference materials. [Standards traceable to NIST, which are used by the laboratory, are listed within individual SOPs.](#)

9.3.6 Calibration- Calibration requirements are divided into two parts: 1) requirements for analytical support equipment, and 2) requirements for instrument calibration. In addition, the requirements for instrument calibration are divided into initial instrument calibration and continuing instrument calibration verification.

9.3.6.1 Instrument Calibration - Analytical instruments are calibrated in accordance with the proper analytical procedure to determine the analyte(s) of interest. After initial calibration of an instrument, a continuing calibration standard is analyzed at specific intervals. The calibration standards must meet the specified QC requirements associated with each test method (see Section 5).

### 9.3.7 Control of Measuring and Test Equipment

9.3.7.1 The purpose of this criterion is to assure that instruments and other measuring and testing devices used in activities affecting program quality are properly controlled, calibrated and adjusted at specified periods to maintain accuracy within design and/or procedure limits.

9.3.7.2 Equipment calibration specific to microbiological analysis.

The laboratory, under the direction of the section leader, determines and documents temperature stability, uniformity of temperature distribution, and time required to achieve equilibrium conditions in incubators and water baths. This procedure is performed during the following two conditions.

9.3.7.2.1 When new equipment is purchased

9.3.7.2.2 On an annual basis for existing equipment

9.3.7.3 Volumetric accuracy checks for disposable pipettes used in microbiological analysis. The laboratory, under the direction of the section leader, determines and documents volumetric accuracy of disposable pipettes. This is accomplished by checking 5 pipettes per case lot.

9.3.7.4 Mechanical timer accuracy checks. The laboratory, under the direction of the section leader, determines and documents the accuracy of mechanical timers. This is done by the following method and frequency.

9.3.7.4.1 Accuracy check is performed on an annual basis and is documented in the logbook.

9.3.7.4.2 Accuracy is compared against an electronic timing device such as a stopwatch.



## 9.3.7.5 General Responsibility

Under the direction of the manager, the supervisors are responsible for the quality of measuring and test equipment under his/her control and for the maintenance of records of calibrations and checks.

## 9.3.8 Reference Measurement Standard List

Reference measurement standards must originate, wherever possible, from sources traceable to NIST. Table 9-3 describes the major standards used in the laboratory and their sources:

Table 9-3  
Reference Measurement Standard List

| Chemical Standard        | Manufacturer/Vendor              |
|--------------------------|----------------------------------|
| PAH Mix                  | VWR-Restek, Supelco              |
| Toxaphene                | ERA, Accustandard, Absolute Stds |
| Chlordane                | ERA, Accustandard, Absolute Stds |
| Hexavalent Chromium      | ERA, Accustandard, Absolute Stds |
| LAS (MBAS)               | ERA, Accustandard, Absolute Stds |
| Calcium Carbonate        | ERA, Accustandard, Absolute Stds |
| TSS                      | ERA                              |
| O&G                      | ERA, Accustandard, Absolute Stds |
| Chemical Standard        | Manufacturer/Vendor              |
| Aroclor Mix (PCB)        | ERA, Accustandard, Absolute Stds |
| 8260B Matrix Spike       | VWR-EM Science                   |
| EPA 625 Kit              | Restek                           |
| Sodium Nitroferrocyanide | VWR-Mallinckrodt                 |
| Sodium salicylate        | VWR-J.T. Baker                   |
| Phosphate (P) Standard   | Labchem, Inc.; Ricca             |
| Mercuric Oxide           | VWR-J.T. Baker                   |
| Multi-element Metals Std | SCP                              |
| Antimony Standard        | SCP                              |
| Furan                    | Aldrich Chemical                 |
| Herbicides Mix           | ERA, Accustandard, Absolute Stds |
| DRO/GRO                  | ERA, Accustandard, Absolute Stds |
| EDB, DBCP                | ERA, Accustandard, Absolute Stds |
| turbidity                | ERA, Accustandard, Absolute Stds |
| 8270C Mix                | ERA, Accustandard, Absolute Stds |
| Semi-Vols Mix            | RTC                              |
| 1,2-diphenylhydrazine    | Restek                           |

## 10.0 PREVENTIVE MAINTENANCE

### 10.1 Instrument Maintenance

All instrument maintenance is recorded in an instrument specific logbook. Entries are dated and initialed by the analyst making the entry.

#### 10.1.1 Routine

All analytical instruments have a routine schedule of maintenance specified by the manufacturer. Routine maintenance is designed to keep the instrument in good operating condition with as little "down-time" as possible. All Analysts should be proficient in maintaining the instruments for which they are responsible.

## 10.1.2 Non-Routine

Any maintenance which must be performed in order for sample analysis to proceed, but is not part of the systematic maintenance schedule, is considered non-routine. Non-routine maintenance must be reported to the Section Supervisor immediately so that its impact on production can be determined. If the ability to analyze samples is adversely affected, the Section Supervisor notifies the Client Services Manager so that alternative action can be coordinated with the client.

(Note: See Appendix II for a complete instrument maintenance summary.)

## 10.2 Preventive Maintenance

### 10.2.1 Maintenance Schedule

EETSE Atlanta is equipped with up-to-date computerized instrumentation. In order to gain maximum performance and minimize downtime, regular inspection, maintenance, cleaning, and servicing of all laboratory and field equipment is performed according to the manufacturers' recommendations.

10.2.2 A maintenance log is kept for each piece of laboratory and field instrumentation, detailing all maintenance performed on the instrument.

10.2.1.1 Routine repairs and maintenance are performed and documented by the analyst responsible for the particular instrument.

10.2.1.2 A log of non-routine maintenance is kept in the instrument repair logbook. As part of this information, the analyst or repair technician signs and dates the logbook.

10.2.1.3 Routine maintenance procedures for laboratory instrumentation are given in Appendix II. The service intervals listed in Appendix II are as follows: D = daily; W = weekly; M = monthly; Q = quarterly; SA = semi-annually; and AN = as needed. (A list of all laboratory equipment may be found in Appendix III.)

10.2.3 An extensive approved spare parts inventory is maintained for routine repairs at the facilities, consisting of GC detectors, AA lamps, fuses, printer heads, flow cells, tubing, certain circuit boards and other common instrumentation components.

10.3 Glassware used in general laboratory operations must be of high quality borosilicate glass (e.g. Pyrex or Kimax). Volumetric dispensing glassware must be Class A wherever possible.

Glassware Cleaning. Laboratory glassware cleaning procedures & guidelines are described in Table 10-1.

TABLE 10-1  
LABORATORY GLASSWARE CLEANING PROCEDURES

| Analysis/Parameter              | Cleaning Procedure (In Specified Order)                |
|---------------------------------|--------------------------------------------------------|
| Extractable Organics (including | Solvents: 13, 1, 2, 3, 4, 7, (6 or 8 optional), 15, 17 |
| Pesticides and Herbicides)      | Or, Muffle Furnace: 13, 1, 2, 3, 4, 14, 15, 17         |
|                                 | Or, Oxidizer: 13, 1, 2, 3, 16, 3, 4, 15, 17            |
| Analysis/Parameter              | Cleaning Procedure (In Specified Order)                |
| Purgeable Organics              | 1, 2, 3, 4, (7 optional), 11                           |
|                                 | Or, 1, 2, 3, 4, (8 optional), 11                       |
|                                 |                                                        |
| Trace Metals                    | 1, 2, 3, 4, 10, 4                                      |
|                                 |                                                        |
| Nutrients, Other Wet Chemistry  | 1, 2, 3, 4, 9, 4                                       |
|                                 |                                                        |

|                                   |                   |
|-----------------------------------|-------------------|
| TKN                               | 1, 2, 3, 4, 18, 4 |
| Minerals, Demands, CN and Phenols | 1, 2, 3, 4        |
| Microbiology                      | 1, 2, 3, 4        |
| Residues                          | 1, 2, 3, 4, 12    |

## Key to Laboratory glassware cleaning procedures:

- 1 Remove all labels with sponge or acetone
- 2 Wash with hot tap water, scrub stopcocks, and other small parts with brush and inside labware using a laboratory-grade detergent
  - Organics – Liquinox, Alconox or equivalent
  - Inorganic Anions – Liquinox or equivalent
  - Inorganic Cations – Liquinox, Acationox, Micro or equivalent
- 3 Rinse thoroughly with hot tap water
- 4 Rinse thoroughly with Deionized (DI) water
- 6 Rinse thoroughly with pesticide-grade methylene chloride
- 7 Rinse thoroughly with pesticide-grade methanol
- 8 Rinse thoroughly with pesticide-grade hexane
- 9 Rinse thoroughly with Deionized (DI) water
- 10 Rinse or soak with 1:1 HCl
- 11 Rinse thoroughly with Deionized (DI) water
- 12 Rinse or soak with 10% HNO<sub>3</sub>
- 13 Rinse thoroughly with Deionized (DI) water
- 14 Bake at 105°C for 3-4 hours (Note: Class A volumetric glassware must NOT be baked!)
- 15 Bake crucibles at 105°C or 180°C for 1 hour (prior to use, as per method)
- 16 After use, rinse with same solvent used
- 17 Drain, let air dry
- 18 then heat in muffle furnace for 15-30 minutes
- 19 Store inverted or capped with suitable material or container stopper
- 20 Soak in oxidizing agent: chromic acid or equivalent
- 21 Rinse with solvent used in analysis as the last step prior to use
- 22 Rinse or soak with 1:1 H<sub>2</sub>SO<sub>4</sub>

Note: Do not let it run continually while washing glassware due to a limited supply of Deionized Water.

## 10.4 Contamination Control

Monitoring for contamination is an important factor in order to ensure the highest quality analytical results. A documented routine monitoring program is in place to verify adequate contamination control. Monitoring is present in several forms.

10.4.1 Media (or Method) Blank is analyzed with every batch of samples to show that the extraction and analytical processes are free of contamination. Clean, unused sampling media undergoes the same preparation and analysis as the samples. The same acids, solvents, and other reagents are used as applicable, with each batch of samples. Typical media includes wipes, filters, and air cartridges.

10.4.2 Routine air monitoring is performed and documented monthly to monitor background levels of fibers (PCM) and fungal spores. Samples are collected in the appropriate locations, logged into the LIMS by the QA Department, and results are evaluated by the department managers.

10.4.3 In addition to Method Blanks, the Volatiles Department performs a daily DI water check for contaminants to ensure the starting water for the day meets acceptable criteria. This provides an indication that resin beds and charcoal are need of changing.

10.4.4 Work areas are routinely wiped down and cleaned to remove contamination. The laboratory performs quarterly lead dust wipe checks to ensure the cleaned areas are free from contamination. Dust wipes

are logged in quarterly for designated areas determined by the QA Department. A 12 inch by 12 inch template is used to wipe down defined areas to check. If analytical results are unacceptable for any area, that location is thoroughly cleaned once again followed by re-sampling and analysis.

- 10.4.5 Hoods are also cleaned on a regular schedule to reduce the chance of contamination in the Asbestos, Metals, and Sample Receiving areas.
- 10.4.6 Certificates of Analysis and contamination checks received from media (bottle) suppliers are maintained on file by lot # to show items were contaminant free when used for sample collection. In addition, the laboratory performs testing of bottles for selected analysis.
- 10.4.7 In order to minimize sample contamination, test strips should not be dipped into the sample or onto material on the bottle cover. To check the sample with test paper (such as pH paper or KI paper used for residual chlorine, except for Coliform testing. See next paragraph.), take a clean disposable pipette and draw sample from the top of the aqueous surface. Remove the pipette, recap the sample and touch the pipette to the test paper. Read the paper to the nearest pH unit.

When checking for residual chlorine on coliform samples, either pour sample out of the container directly onto the KI paper or touch the paper to the remaining droplets in the container after the sample has been poured out.

## 11.0 QC CHECKS AND ROUTINES TO ASSESS PRECISION, ACCURACY AND METHOD DETECTION LIMITS

### 11.1 Control of Special Processes

- 11.1.1 In certain processes, the existence of a required level of quality cannot be assured by the examination of the end result alone. Such special processes that relate to the conduct of programs include performance of detailed chemical procedures, interpretation of raw data and the use of advanced data analysis techniques.
- 11.1.2 For such processes, quality assurance is obtained through the development of thorough analytical and operational procedures. QA is also obtained by personnel screening and documented training to ensure the necessary level of personnel qualifications and capabilities and by the use of QC samples. This section describes how personnel are qualified in accordance with specified requirements.

### 11.2 Quality Control in the Laboratory

- 11.2.1 Various types of quality control samples are used at EETSE Atlanta, Inc., in each of the following areas:

- Bulk Asbestos
- Air Asbestos
- Gas Chromatography/Mass Spectrometry
- Gas Chromatography
- Inorganic Analysis
- Wet Chemistry
- Microbiology
- Sample preparation

- 11.2.2 Some of the activities used to qualify the procedures (and data) are described:

#### 11.2.2.1 Standards

The Section Supervisor (or designee) is responsible for the preparation and documentation of stock standards and working standards. Standard reference materials are obtained from suppliers and have Certificates of Analysis to certify the analyte concentrations. When available, traceable reference materials are to be used. As a minimum, information on reference materials includes manufacturer, lot or batch number, date of receipt, expiration date,

and any other accompanying preparation or assay information. The most recent release of the NIST standards library shall be used for mass spectral interpretation.

### 11.2.2.2 Calibration and Performance Check of Instruments

Different types of reference material are used to calibrate the various analytical instruments in the laboratory areas. For most of the analytical instruments used in the laboratory, calibration and performance checks are conducted at the beginning of an analytical run, periodically throughout the run and at the end of the run, (e.g., Atomic Absorption Spectrophotometers), while others are calibrated once then checked daily. The performance checks must be from an outside source, such as an alternate manufacturer, or may be from the same manufacturer as long as it originates from a different lot or batch. Calibration is also performed when the analytical method is initially set-up, when an instrument has been through major maintenance, or the instrument fails its QC check.

### 11.2.2.3 Inter-Laboratory Analysis of QC Samples

Client and method requirements determine the frequency and type of spikes, blanks, splits, method standards, surrogate standard, internal standard and external source analyses. These normally account for 10 – 20% of the data points generated by the laboratory.

### 11.2.2.4 Inter-Laboratory Analysis

EETSE Atlanta, Inc. participates in various accreditation programs that require the analysis of either agency-supplied performance samples or proficiency test study samples purchased from a TNI or AIHA LAP approved PT provider as required. Results of these performance results are reported and maintained in QA files. Results which are evaluated as “Not Acceptable” are documented and reviewed by the Quality Assurance department and resolved through discussion with analysts and their supervisors, examination of all raw data, re-assessment of sample preparation directions and techniques, and a review of data and calculations.

### 11.2.2.5 Computational Checks

Any hand calculations are checked by a second individual, in most cases the section supervisor. The person performing the crosscheck must be qualified in the relevant technical discipline. For computations performed automatically using verified software, and which contain a hard copy of the entered computation, only the entries are checked.

### 11.2.2.6 Review and Analysis of Data

The review and analysis of data for analytical measurements are performed on a timely basis using Quality Control checklists. The data is checked for reasonableness and consistency by the section Supervisor and/or the manager.

### 11.2.2.7 Detection Limit Studies

The detection limit of an analyte is defined as the smallest amount of an analyte that can be detected (for instrumentation, above the background noise) within a stated confidence limit. There are several types of detection limits that may be applicable to a given method. The Instrument Detection Limit (IDL) is the amount of analyte needed to produce an adequate response above an instrument's baseline noise. The IDL may be use to estimate a Method Detection Limit (MDL). The Practical Quantitation Limit (PQL), also called the Reporting Limit (RL) is defined as the lowest level of quantitation achievable during routine laboratory operations. Some agencies define the PQL more rigidly as 3.33 times the MDL. However, the PQL is highly matrix dependent.



## 11.2.2.8 Recovery of Known Additions (Spikes)

Recoveries of known additions of analytes are used to determine the effect of the sample matrix on the given analytical procedure. The Laboratory Control Sample (LCS) and sample Matrix Spike/Spike Duplicate (MS/MSD) are used to monitor and control the analytical process. The recovery of spiked analytes in the sample matrix gives a definitive measure of the sample preparation processes.

11.2.2.8.1 LCS data is used to monitor the laboratory's performance in respect to sample preparation and equipment operation. It is prepared in an analyte free matrix similar to the sample, i.e. water or soil. Recovery limits for the LCS are established by the laboratory through control charting of each analyte.

11.2.2.8.2 A matrix spike/matrix spike duplicate pair is analyzed to determine the effect of the sample matrix on extraction efficiency and analyte recovery. One MS/MSD pair should be prepared and analyzed in every batch of 20 or fewer samples when possible. In some cases, the client may specify which sample is to be used for the MS/MSD. If not, the laboratory picks a representative sample at random. Advisory MS/MSD recovery limits are established for aqueous and soil matrices. For TCLP analysis, a matrix spike is prepared and analyzed for each waste type (e.g. oil, solid) associated with a batch of 20 or fewer samples of similar matrix.

## 11.2.2.9 Surrogates

As a means of monitoring individual sample extraction efficiency, one or more surrogate compounds are added to each blank, LCS, client sample, and QC sample prior to preparation. Recovery limits for surrogate compounds are established by the laboratory through control charting of each analyte. Typically, one of the following actions will be required when a sample surrogate recovery is out of the established control limits.

- Re-extract and/or reanalyze the sample
- Flag the results as estimated

11.2.2.10 Clients may specify the required action to be taken for recovery failure. Client specific requirements are conveyed to the analytical sections through project management.

## 11.2.3 Tracking Internal QC Samples

The tracking of internal QC samples through the LIMS provides laboratory personnel with various types of information. This information is used for the following purposes:

11.2.3.1 Long term trends are monitored through the use of quality control charts. Any upward or downward change in the recovery of analytes signifies that some procedural change has taken place. If trending is observed, the Technical Director reviews all test procedures and makes any corrections as required.

11.2.3.2 The number of quality control samples as a function of total laboratory samples is monitored so as to ensure that the laboratory analyzes the adequate number of Quality Control samples for each extraction or analytical batch.

11.2.3.3 The following guidelines are followed when implementing and utilizing QC Charts:

11.2.3.3.1 Through LIMS the Technical Manager plots the percent recovery of the LCS analyte versus the date of preparation or analysis; whichever is most appropriate.

11.2.3.3.2 For organic analyses employing surrogates, the LCS surrogate % recoveries are monitored on QC Charts. The recovery of at least one target Aroclor (PCB) in the Pesticide/PCB LCS is monitored on a QC Chart (e.g. TPH).



- 11.2.3.3.3 For trace metals determined by inductively coupled plasma (ICP) at least three metals spiked in the LCS are monitored on QC Charts (e.g. Cd, Cr, Ni). For trace metals determined by graphite atomic absorption (GFAA) and cold vapor atomic absorption (CVAA), an LCS for each element is monitored on a QC chart.
- 11.2.3.3.4 For General Chemistry, an appropriate LCS for each method is used. Each LCS analyte recovery method is monitored on a control chart.
- 11.2.3.3.5 Each section, prior to the calculation of in-house limits, establishes initial control limits. These preliminary limits are derived from published method criteria if available. If no such criteria are available, the preliminary limits will be mutually set (usually interim limits are set at 70-130% as stated in SW-846) and agreed to by the Department Manager, Technical Director, and Quality Assurance Manager. Twenty data points are recommended to establish the initial calculated control limits. In some cases, it may be appropriate to use fewer data points to establish the first set of calculated limits, however, at no time should fewer than seven data points be used.
- 11.2.3.3.6 Control chart limits are updated periodically when sufficient additional data points are available. Typically, limits are updated for each set of 20 to 50 new data points. More frequent updates may be warranted in some cases
- 11.2.3.3.7 Each control chart has upper and lower warning limits established at  $\pm 2$  standard deviations ( $2\sigma_{n-1}$ ) from the mean % recovery (centerline)
- 11.2.3.3.8 Each control chart has upper and lower control limits established at  $\pm 3$  standard deviations ( $3\sigma_{n-1}$ ) from the mean % recovery (centerline).
- 11.2.3.3.9 The analyst performing the method enters the data into LIMS. The data is evaluated frequently to identify trends that might occur in an "out of control" situation
- 11.2.4 The method blank is an analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The method blank is carried through the complete sample preparation and analytical procedure. The method blank is used to document contamination resulting from the analytical process.  
  
For the method blank to be acceptable for use with the accompanying samples, the concentration of the blank of any analyte of interest cannot exceed the method detection limit or required reporting limit. Section 5 lists certain conditions in which contaminated blanks may be used for quality control purposes.
- 11.2.5 An instrument blank may be run after any sample that gives a response that exceeds the calibration range for the instrument to show that there is no carry-over to the next analysis. The instrument blank shall consist of high purity solvent (e.g. hexane for pesticide analysis by GC/ECD, methylene chloride for semi-volatiles analysis by GC/MS).
- 11.2.6 An Initial Calibration Blank (ICB) is analyzed before sample analysis begins to verify there is no carryover contamination or instrument drift. ICB samples usually accompany inorganic instrumental analysis.
- 11.2.7 The analysis of sample duplicates that contain detectable quantities of analytes is an effective means for assessing the precision of an analysis. Refer to the individual analytical procedures or LIMS test codes for guidance concerning the frequency and criteria for sample duplicate analyses.

## 11.3 Inter-laboratory Quality Control

Each section of the laboratory may be given blind and double blind samples to analyze for requested parameters. Blind samples may be assigned in containers to be diluted, digested, and/or extracted and analyzed by the appropriate laboratory section. Double-blind samples may arrive on a pre-scheduled basis from a “client” as real samples to be analyzed by designated analytical sections for specific analytes.

### 11.3.1 Blind QC Samples

Blind QC samples may be used as a test of proficiency for analysts needing certification and/or qualification for performing an analysis. The Section Supervisor should obtain the QC sample from either the Quality Assurance Department or from a source independent from the source of standards for the analysis.

### 11.3.2 Double - Blind QC Samples

Quality Control samples may arrive from a “Client” to be analyzed for specific analytes. These samples will arrive as real samples and will not be known to anyone outside Quality Assurance and Project Management. The results of these double-blind samples will be sent to the “client” to be compared to the true value of the samples. The laboratory’s performance on these samples will be compared to other laboratories in the program. These results will be mailed to the Quality Assurance Department. Results are used to identify areas needing improvement.

## 11.4 Out-of-Control Conditions in Laboratory Control Samples

### 11.4.1 Any of the following control chart conditions indicates the loss of process control:

- 11.4.1.1 Any one point that is outside of the control limits.
- 11.4.1.2 Any three consecutive points that are outside one of the warning limits.
- 11.4.1.3 Any eight consecutive points on the same side of the centerline.
- 11.4.1.4 Any obvious cyclic or repetitive pattern seen in the points.

### 11.4.2 Reactions to “Out-of-Control” Conditions

In the event of an “out-of-control” condition, analyst should respond to the condition as follows:

- 11.4.2.1 Stop analysis.
- 11.4.2.2 Investigate the root cause of the failure
- 11.4.2.3 Implement any required corrective action.
- 11.4.2.4 Document the situation in a non-conformance memo prior to initiating subsequent analyses.

## 11.5 Identification of Analytes

### 11.5.1 Organic Analyses

The identification of analytes is accomplished by comparison of unknown samples with known standards. All standards shall be traceable as specified by the applicable analytical procedure.

#### 11.5.1.1 Gas Chromatography

All sample identifications are made by a comparison of the retention time of the standard peak to the retention time of the unknown peak. The identification of any analyte, which is identified during the primary analysis, is verified through the use of a confirmation column or by GC/MS unless specifically exempted in the applicable procedure.

#### 11.5.1.2 Gas Chromatography/Mass Spectrometry (GC/MS)

For positive identification of an analyte by GC/MS, the spectrum of the analyte must conform to a spectrum of the authentic standard obtained after satisfactory tuning of the mass

spectrometer. The appropriate analytical methods should be consulted for specific criteria for matching the mass spectra, relative response factors and relative retention times to those of authentic standards. Tentative identifications may be made based on conformance to published mass spectra in reference texts or spectral library databases.

#### 11.5.2 Inorganic Analyses

The identification of analytes is accomplished by comparison of unknown samples with known standards. All standards shall be traceable as specified by the applicable analytical procedure.

##### 11.5.2.1 Metals

The concentration of a metal analyte is based on the absorption or emission of light measured at a specific wavelength. The wavelength selected is in accordance with the applicable procedure. Standards used to generate the calibration curve are traceable to NIST or other nationally recognized (e.g. EPA).

##### 11.5.2.2 Wet Chemistry

Standards used to prepare calibration curves or to standardize instruments are traceable to NIST or other national sources (e.g. EPA).

#### 11.6 Quantitation and Reporting of Analytes

##### 11.6.1 Reduction of Sample Data

Data reduction is defined as the processing of instrument generated numbers by an analyst to achieve a final result. Data reduction is used for sample analysis as well as for quality control criteria.

Processing of numbers may be achieved using manual and/or computer aided calculations.

11.6.1.1 All data reduction follows calculations found in approved procedures for the analysis.

11.6.1.2 An analyst who is qualified to perform the analysis performs all data reduction. If a Section Supervisor performs data reduction, another qualified analyst reviews the data.

11.6.1.3 All numbers used in the reduction of data are present on data reports and are easily retrievable.

11.6.1.4 All computer-generated calculations are performed using a validated program/spreadsheet.

#### 11.7 Reporting Data

##### 11.7.1 Significant Digits

All digits in a reported result are considered to be definite, except for the last digit, which may be in doubt. Such a number is said to contain only significant figures. If more than a single doubtful digit is carried, the extra digit or digits are not significant. The following rules apply to all reported analytical results from all laboratory sections:

11.7.1.1 All digits from a measurement are recorded. These numbers are used in the calculation of the results. After all calculations have been performed, the number is rounded to the required number of significant digits.

11.7.1.2 The number zero may or may not be a significant digit, depending on placement of the decimal.

11.7.1.3 Final zeroes, after a decimal, are always significant (Ex. 9.80 has three significant figures).

11.7.1.4 Zeroes before a decimal point with non-zero digits preceding them are significant. Zeroes with no non-zero digits before them are not significant (e.g. 10.3 has three significant digits, 0.53 has two significant digits).

11.7.1.5 If there are no non-zero digits preceding a decimal point, the zeroes after the decimal point but preceding other non-zero digits are not significant. These zeroes only indicate the position of the decimal point.

11.7.1.6 The final zero in a whole number may or may not be significant.

11.7.1.7 When mathematical functions are performed on multiple numbers, the number with the least number of significant digits dictates how many significant digits the end result should have.

#### 11.7.2 Rounding Rules

11.7.2.1 Once the number of significant figures obtainable from a particular analysis is established, data resulting from the analysis are reduced according to the standard rules for rounding which state: If the number value to be rounded is 5 or greater, round up. If the number value is less than 5, round down.

11.7.2.2 Rounding off numbers is a necessary operation in all analytical sections of the laboratory. It is automatically applied by the limits of measurement of every instrument and all glassware.

#### 11.7.3 Reporting Units

The appropriate unit of measurement shall accompany all sample results reports.

#### 11.7.4 Reporting on a Wet vs. Dry Weight Basis

When required, solid sample results are reported on a dry weight basis and documented in the report. When results are reported on a wet weight basis, the results are reported "as is".

#### 11.7.5 Reporting % Recovery and RPD

Unless otherwise directed by the customer, the Technical Director, or the QA Manager, the % Recovery and RPD are reported to one decimal place.

### 11.8 Storage of Quality Related Data

The laboratory retains all data and information that pertains to a project for a period of 5 years. The data may be stored electronically, as hard copy, or both.

#### 11.8.1 Calibration Data

All calibration data, which pertains to a specific project, is stored in an easily retrievable manner. Easily retrievable manner is defined as retrievable in the same day for current projects, or within 24 hours for archived projects.

#### 11.8.2 Quality Control Data

All quality control related data (i.e. blanks, blank spikes/duplicates, matrix spikes/duplicates, etc.) is stored in the associated project file. If more than one project is associated with the QC data, copies are made and stored with each associated project.

#### 11.8.3 Logbooks (Notebooks)

Laboratory logbooks are kept in the laboratory while in use. Once completed, the logbooks are archived in an easily retrievable location.

#### 11.8.4 QC Charts

While in use, QC charts are stored in LIMS. When the QC Chart is no longer being used, it is archived by the section in a central location in the Server.

### 11.9 Internal Performance Audits

Internal performance audits are a means for the Quality Assurance Department to determine the applicability, effectiveness, and utilization of procedures by all sections. Designated personnel perform the performance audits. At the beginning of each year, and on an on-going basis, a schedule of audits and surveillance is developed and updated by the Quality Assurance Section. Surveillance is performed on an unannounced basis with the sections so that objectivity may be maintained. Findings from audits

and surveillance are documented and corrective actions are implemented. Additional surveillance is scheduled to ensure that all deficiencies are corrected.

### 11.10 Failure of Quality Control Indicators

When there is a quality control failure that impacts data quality, the event must be documented using the procedures described in Section 13 of this document.

## 12.0 DATA REDUCTION, REVIEW AND REPORTING

12.1 Introduction: In order to provide the highest quality data possible, an extensive system for data reduction, review, and reporting has been implemented.

### 12.2 Sample Analysis and Data Reduction

Through the use of the worksheets, the samples are prepared following the procedures given in each of the SOPs that follow EPA's approved methods. The preparation information is recorded in logbooks throughout the laboratory.

#### 12.2.1 Data Reduction

Most sample concentration results are read directly from instrumentation without further reduction or calculations. Dilution factors are applied upon the dilution of samples having concentrations above the calibration range. In many cases, these are put into the computer and correct results are calculated automatically. In other cases, a manual calculation may be made. Data from methods requiring manual reduction prior to reporting include titrimetric methods, BOD, COD, conductivity, manual UV/VIS/IR and residue. All laboratory pH meters are temperature compensated.

The laboratory raw data containing the instrument-generated reports, manually calculated results, and all supporting preparation, calibration, and analytical data are scanned as pdf file and posted in laboratory archives (portal server).

#### 12.2.2 Chromatographic and Data File Identification

Chromatograms and data files are given a unique alphanumeric identification by the chemists initiating the analyses in each section. These file identification numbers reflect either the date the sequence was initiated (GC sections), the order in which samples were analyzed (GC/MS sections), and/or the sample identification and log numbers given by the client and listed on the LIMS.

### 12.3 Data Transfer and Review

#### 12.3.1 Data Transfer to LIMS

The analytical results are entered on the department worksheets after review or by direct electronic transfer from the instrument data system. The analysts enter the worksheet data into the LIMS. After the data is entered into the LIMS, approval sheets are printed and checked against the information entered into the LIMS for transcription errors and anomalies.

#### 12.3.2 Data Review

Laboratory analytical results are reviewed by at least two analysts or a section supervisor prior to entering the reportable data into the LIMS. The review of the data includes checking the extraction, digestion, distillation, and other preparation logs, ensuring that all precision and accuracy requirements are addressed, and ensuring that all steps of the analyses have been completed. If any problems were indicated during the analysis of the sample batch, it is the responsibility of the analyst and the section supervisor to bring this to the attention of the project manager, section manager and QA manager through a written corrective action report.



## 12.3.3 Data flags

Data flags are used on reports as needed to inform the project manager and the client of any additional information that might aid in the interpretation of the data. The data flagging system incorporates data qualifiers which are similar to flags specified in the Contract Laboratory Program protocols, as well as additional flags used to help explain batch specific events.

## 12.3.4 Final Report

When data acquisition and reporting have been completed, the project manager reviews and prepares the final report. Because the project managers have extensive experience in evaluating analytical data, they have developed both objective and subjective techniques for data review. Each value reported is reviewed in the context of the respective environmental matrix and all available QC/QA data.

Final Reports shall include the following:

- Title (e.g. Transmission Electron Microscopy Analysis Report)
- Name and address of the laboratory
- Unique identifying number
- Name and contact information of the customer
- Identification of the method used
- Sample description and if necessary, condition of it
- Date of sampling and receipt
- Date the test was performed
- Date report was issued
- A statement that the results relate only to the items tested as received
- Units of measure, where appropriate
- Deviations from the method
- Reports from Subcontract Laboratories included as they were received

The laboratory is responsible for information provided in the report, except when information is provided by the customer. Data provided by the customer will be clearly identified. A narrative will be added to the report information supplied by the customer can affect the validity of the results.

12.3.4.1 The QA Manager will periodically review test reports in compliance to AIHA LAP LQSR prior to issuance and document this review via a tracking spreadsheet and by adding a comment to the work order.

12.3.4.2 Abnormal values are carefully scrutinized, and samples are reanalyzed if the abnormalities cannot be explained.

12.3.4.3 If the results from spiked samples suggest interferences (low or high bias), attempts are made to remove the interferences, or the data is flagged and/or a project narrative is included with the report. Laboratory qualifiers are defined as follows:

- \* - Value exceeds maximum contaminant level
- B - Analyte detected in the associated method blank
- BRL - Below Reporting Limit
- E - Estimated (Value reported above quantitation range)
- H - Holding times for preparation or analysis exceeded
- J - Estimated value detected below Reporting Limit
- N - Analyte not NELAC (TNI) certified
- Narr - See Case Narrative
- NC - Not Confirmed
- R - RPD outside accepted recovery limits



Rpt Lim - Reporting Limit

S - Spike recovery outside accepted recovery limits

> - Greater than Result value

< - Less than Result value

12.3.4.3 Clients are instructed to provide sufficient sample for the analysis of Matrix Spike and Matrix Spike Duplicate analysis, however there are times when the laboratory does not receive sufficient aqueous sample volume to perform these analyses. If an aqueous sample batch is analyzed without the inclusion of a spike/spike duplicate sample(s), this fact is added to the report narrative per TNI requirements. Example verbiage is as follows:

*The TNI requirement for the analysis of a matrix spike/matrix spike duplicate could not be performed on Batch (#) due to insufficient sample volume submitted.*

### 12.4 Special Project or Data Package Review

If the client requests special handling and/or data packages, the Laboratory Director, Technical Director, or Quality Assurance Manager may also review the project report and the raw data. This review includes checking holding time requirements and calibrations, reviewing all quality control data and/or control charts, and initiating any corrective actions or re-analyses that might be appropriate.

### 12.5 Quality Control Reports

EETSE Atlanta, Inc. offers four levels of quality control reporting. Each level contains all the information provided in the preceding level, in addition to its own specific requirements. The quality control packages provide data in the following levels:

12.5.1 Level I - method references, preparation and analysis dates, surrogate(s) recoveries and reporting limits.

12.5.2 Level II - Level I information plus results for the blank, LCS and MS/MSD and sample duplicates.

12.5.3 Level III - Level I and II information plus all raw data associated with sample preparation, instrument calibration (if applicable) and sample analysis.

12.5.4 Level IV - Level I, II and III information in a CLP "look-alike" format, and all sample raw data.

### 12.6 Reporting Criteria

The final report is printed and signed by the Laboratory Manager, the Director of Project Management or a Project Manager after all review has been completed. The Laboratory Manager, the Director of Project Management and Project Managers serve as designees for technical director for report signing. The data flags that may appear in a project report are defined and any additional comments are included in the Case Narrative.

12.6.1 If requested by the client or a project specific QA Plan, custom reports or data packages can be provided. When data packaging is requested, a paginated data package is provided in addition to the project report. The format of the project report and/or data package can be adjusted to meet the needs of the client. All LIMS reports can be downloaded onto diskettes or to most clients' computers.

12.6.2 When the project report must meet TNI requirements, the report will include a certification statement indicating the results meet TNI standards, an estimated uncertainty statement, and a format that includes the total number of pages in the report.

12.6.3 EETSE Atlanta, Inc., will not intentionally divulge to any person (other than a client or person designated by a client in writing) any information regarding the services provided by EETSE Atlanta or any information disclosed to EETSE Atlanta by the client **unless required by law or authorized contractual arrangement. In these instances, the client will be notified unless prohibited by law.** Any

information *known* to be potentially endangering to national security or any entity's proprietary rights will NOT be released.

- 12.6.3 Test results are reported according to client requirements. If a client requests to have reports or information sent by fax, the client is notified in advance of the transmission, whenever possible, and all documents include a cover sheet with the following statement:

### NOTICE OF CONFIDENTIALITY

*The information contained in this facsimile message may be legally privileged and is confidential information intended only for the use of the individual or entity named above. If the reader of this message is not the intended recipient, you are hereby notified that any use, dissemination, distribution or copy of this facsimile message is strictly prohibited. If you have received this facsimile message in error, please contact us by telephone at (770) 457-8177 and return the facsimile message to us at the address above via the US postal service.*

All documents sent by email should include the following statement:

*NOTICE OF CONFIDENTIALITY: The information in this email and / or attachments may be legally privileged and is confidential information intended for the use of the individual or entity named in the email address. If the reader of this message is not the intended recipient, you are hereby notified that any use, dissemination, distribution, or copy of this email and / or attachments is strictly prohibited. If you have received this email in error, please notify EETSE Atlanta Customer Service by telephone at (770) 457-8177 or delete the message. Thank you.*

## 12.7 Record Keeping

Procedures are in place to ensure that all records required under TNI Chapter 5 and AIHA LAP program requirements are retained. The laboratory maintains a record keeping system that can produce unequivocal, accurate records that document all laboratory activities.

- 12.7.1 When an analytical batch is prepped and analyzed, the analyst enters the data into the LIMS system and gives the raw data, quality control data and a copy of the prep log (if applicable) to the department manager to review.
- 12.7.2 Any problems encountered during sample preparation and analysis are corrected and brought to the attention 12.8.1 Sample Preparation, E of the department manager.
- 12.7.3 After department manager review, data is validated in the LIMS system for reporting to the client.

## 12.8 Records of Analysis

### 12.8.1 Sample Preparation, Extraction, Distillation, and Digestion

All steps of the preparation, extraction, distillation and/or digestion of samples are thoroughly documented. Documentation is determined by the QA Manager, Laboratory Manager, and the Technical Director and includes (if applicable):

- 12.8.1.1 Standard Identification
- 12.8.1.2 Dilution Factors
- 12.8.1.3 Sample Identification
- 12.8.1.4 Reagent Identification
- 12.8.1.5 Date the extraction, digestion, and or analysis was performed
- 12.8.1.6 Initials of the analysts performing the digestion, extraction, and or analysis
- 12.8.1.7 Volume/weight of sample used

12.8.1.8 Final volumes/weights

12.8.1.9 Initial and final review signatures, where required

12.8.1.10 Instruments used

## 12.8.2 Preparation of Standards and Reagents

12.8.2.1 The preparation of all standards and reagents are documented. The lot numbers of all standards associated with a particular project are traceable either through the instrument logbook, a QC check list, a worksheet, or another approved document.

12.8.2.2 Original vendor Certificates of Analysis are distributed by the Shipping and Receiving Office to the intended departments.

## 12.9 Standard and Reagent Traceability

Standards and reagents are tracked in the LIMS chemical inventory system for traceability and auditing purposes. The method of standard and reagent tracking is outlined in the subsequent sections.

12.9.1 When a standard/reagent is needed that is not already on the approved vendor/materials order list, supervisors forward purchase requests to the Technical Director and/or Laboratory Manager for approval. The standard/reagent is ordered from a reputable vendor (EETSE Atlanta typically uses VWR). The laboratory attempts to use certified reference materials from providers who conform to ISO Guide 34.

12.9.2 The information supplied to the Technical Director and / or Laboratory Manager must have the supplier standard or reagent name, order number, size or amount of each unit, grade or purity, price, if possible, and quantity. Upon receipt, supplies (and services) are reviewed to ensure they comply with requirements. When a vendor has been approved for services, a note is placed in the comments field of the Vendors database within LIMS.

12.9.3 When the standard or reagent arrives, it is logged into the LIMS, usually by the department supervisor or by the sample custodian. All reagents and standards received are electronically tracked and documented by computer via the Laboratory Information Management System.

12.9.4 Each standard or reagent is given a unique chemical inventory number upon receipt. The next available number in the LIMS is automatically assigned, starting with #5001. The computer entry is completed by entering the correct information in the required fields.

12.9.4.1 The expiration date for neat standards and reagents is determined using the manufacturer's expiration date, if available. Otherwise, a 1 year expiration date is assigned to volatile organic compounds and standards and 5 year date for acids, dry chemicals, solvents, reagents, and other chemicals. Each standard and reagent is clearly and permanently labeled with its expiration date in indelible ink. The assigned expiration date for intermediate standards will not exceed the manufacturer's expiration date of the stock standard.

12.9.4.2 Secondary standard containers are labeled with the corresponding LIMS tracking number of the source material, the date the contents were prepared, the six month expiration date, the name of the analyte(s), the concentration of each component of the solution, the matrix and the initials of the person who prepared it.

12.9.4.3 The chemical inventory number must appear on both the standard and reagent container, and the upper, right-hand corner of the certificate of analysis. It must also be included, if applicable, in standard/preparation, analyses or sample preparation log books.

12.9.4.4 Secondary standard labels include the LIMS chemical inventory number, the standard name, intended use (spiking, surrogate, reference or calibration solution), and concentration with units, expiration date and initials of the person who prepared it. As long as this is available, all other information can be found in the LIMS.

12.9.5 Spiking, surrogate, reference and calibration solutions and calculations are recorded in the appropriate "Standard/Preparation Log Book." Logbooks cover the following areas: Organics, Organics Preparation, Semi-Volatile Organics, Microbiology, Metals, Mercury & Wet Chemistry.

12.9.6 Some containers such as standards containers for organics are small and there may not be enough room to list all of the required information on the container. Should this occur, it is permissible to attach a label to the bottle.

12.9.7 When a standard or reagent is added to a sample for any reason, the LIMS chemical inventory number of that standard or reagent and the amount added must be recorded in the appropriate logbook. For example, if a stock standard MET #33-89-5431 of 1000 mg/L is diluted to 100 µg/L, the following line is entered: 1 ml MET #33-89-5431 to 100 ml DI water, 1 ml of 100x to 100 ml DI water, final conc. = 100 µg/L. (NOTE: "MET #33-89-5431" = Metals Department Standard/Preparation Log Book 33, page 89, LIMS Chemical Inventory Number 5431).

12.9.8 If the standard is used as a stock standard and aliquots of it are diluted to produce working standards, the stock standard's LIMS chemical inventory number is used. The standard concentration or a designator such as "1" or "A" is used to differentiate between each serial dilution.

## 12.10 Standard Verification

### 12.10.1 Certificates of Analysis

12.10.3.1 Each department is responsible for maintaining all certificates of analysis received with its standards and reagents. The LIMS-assigned chemical inventory number is written in the upper, right-hand corner of each COA. The certificates are maintained on the portal server. The certificates are held for a minimum of five years.

12.10.3.2 Most accrediting authorities require that a certificate of analysis is kept on file for all standards used in the laboratory. If at all possible, a certificate for reagents should also be obtained. This documentation serves two purposes; 1) it gives further traceability for the standard or reagent, and 2) it provides a manufacturer's guarantee that the standard is comprised of the compounds at the levels listed.

## 12.11 Estimation of Uncertainty (for AIHA LAP accreditation)

Estimation of Uncertainty is the parameter associated with the result of a measurement that characterizes the dispersion of the values that could reasonably be attributed to the measurement. A reasonable 'Estimation of Uncertainty' shall be based on knowledge of the performance of the method and on the measurement scope and shall make use of, for example, previous experience and validation data. It is monitored by the monthly checks, proficiency exam results and error rates. The estimate of day-to-day precision is determined by comparison of duplicate samples (or matrix spike duplicates). Results of the two analyses are compared by their relative percent difference, RPD:  $(A-B) / (\text{Average of A and B})$ .

Estimation of Uncertainty Limits may be method / program specified (e.g. AIHA LAP ELLAP) or based on historical laboratory limits. Interim limits are used until enough data points have been generated to set representative limits. The actual limits are calculated annually and are posted on the portal server.

Estimation of Uncertainty Policy follows the AIHA LAP Accreditation Program requirements with respect to the [measurement uncertainty](#) for tests associated with their scope of accreditation. The requirement which underlies this policy is found in ISO/IEC 17025:2017, Section 7.6).

### AIHA LAP Uncertainty and Uncertainty Limits Determinations

The Measurement Uncertainty is the result of the evaluation aimed at characterizing the range within which the true value of a test result is estimated to lie, generally within a given likelihood. Non-negative parameter characterizing the dispersion of the quantity values being attributed to the measurand, based on the information used.

#### 12.11.1 Definitions of Terms used by the laboratory

Bias is the total systematic error manifested as a consistent positive or negative deviation from the true value.

Measurand is the quantity intended to be measured or analyte concentration.

Precision is the closeness of agreement between measured quantity values obtained by replicate measurements under the same conditions. Precision is commonly expressed as standard deviation or relative percent difference and can be evaluated by the analysis of duplicate samples or duplicate sampling media spikes.

Type A evaluation of measurement uncertainty: Evaluation of a component of measurement uncertainty by a statistical analysis of measured quantity values obtained under defined measurement conditions. This approach uses existing data from routine laboratory quality control samples such as certified reference material, laboratory control samples, duplicates, or data from method validation studies and proficiency testing (PT) study results.

Type B evaluation of measurement uncertainty: Evaluation of a component of measurement uncertainty determined by means other than a Type A. This approach involves the estimation and compilation of individual uncertainties for each contributing measurement.

Contributors to consider for measurement uncertainty are listed in Table 12-1.

#### 12.11.2 The laboratory utilizes Type A approach for the Estimation of Uncertainty. One or more of the following options are utilized:

12.11.2.1 Uncertainty specified within a standard method. In those cases where well recognized test method (such as NIOSH, OSHA, etc. method), specifies limits to the values of the major sources of [measurement uncertainty](#) and specifies the form of presentation of calculated results, laboratories need not do anything more than to follow the reporting instructions as long as they can demonstrate they follow the reference method without modification and can meet specified reliability.

12.11.2.2 Laboratory Control Samples (LCS) and Matrix Spikes. In cases where matrix specific LCS (CRM or media spikes) and/or matrix spike data are available, include uncertainty estimated from the standard deviation of long term data collected from routine sample runs for existing test methods or from the standard deviation of the LCS or matrix spike data for method validation/verification studies for new test methods.

12.11.2.3 Duplicate Data. In cases where sub-sampling occurs and there are data over the reporting limit, include uncertainty estimated from long term duplicate data collected from routine sample runs for existing test methods or method validation/verification studies for new test methods.



12.11.2.4 Proficiency Testing (PT) Sample Data. In cases where the previous options are not available and where PT samples are analyzed with sufficient data above the reporting limit, pooled PT sample data can be used to estimate uncertainty.

12.11.3 Uncertainty determinations specific to each type of testing for AIHA LAP is as follows:

12.11.3.1 Industrial Hygiene Chemical/Gravimetric Analysis.

The laboratory uses the Type A approach to Measurement Uncertainty. Acceptance limits are determined using historical LCS (CRM or media spikes) data for each procedure/target analyte. Once at least twenty values are available, the mean and standard deviation of the data set are calculated. Bias is noted and available for reporting. The data is evaluated for outliers using standard Grubbs Outlier calculations with statistical outliers omitted. Control limits are set at  $\pm 3$  standard deviation and for measurement uncertainty  $k=2$ , or  $\pm 2$  standard deviation are used.

Where target analyte spiking is not applicable such as for gravimetric testing, only precision limits are used for uncertainty determinations. If less than 50 points are available for calculation, the limits are considered interim limits.

12.11.3.2 Industrial Hygiene Asbestos by PCM Analysis. Ranges of uncertainty for IH asbestos by PCM testing are determined for precision only using daily reference slide and blind recount analyses as described below.

12.11.3.2.1 The laboratory's set of reference slides includes slides from previous PAT rounds, Round Robins and field samples. The laboratory acceptance limits are determined from data accumulated from blind recounts of these reference slides and established at 95% confidence limits. From blind repeat counts of reference slides, Sr values obtained for 3 following ranges: 5-20 fibers in 100 graticule fields; 20.5-50 fibers in 100 graticule fields; 50.5-100 fibers in 100 graticule fields.

12.11.3.3 Environmental Lead Analysis under the ELLAP Program: Ranges for uncertainty for ELLAP testing for precision and accuracy are determined by the laboratory. Monitoring of method performance and bias is accomplished using statistical process control (charts or database) for monitoring EETSE Atlanta laboratory performance with QC sample analysis (LCS/LCSD, MS/MSD). SOPs (Sec. 13) for Lead in Paint, Lead in Wipes, Lead in Soil (SW 7000D), and Lead in Airborne Dust describe the required minimum performance criteria for QC sample analysis and the method performance for the laboratory. Method performance and bias are evaluated on an annual basis by the QA Manager. If the calculated limits are **outside those listed in Table 3 of the current LQSR, an evaluation of them will be performed. All monitoring data in the form of control charts are maintained/posted to the portal server, the laboratory's archival system.**

12.11.3.4 Quantifiable Fungal Analysis for reporting under the EMLAP Program. Ranges for uncertainty for quantifiable fungal testing are determined for precision only. Duplicate samples are counted for at least 5% of samples for inter-analyst precision monitoring and replicates samples are counted by different analysts for intra-analyst precision monitoring. Uncertainty ranges are determined using the mean of the range of the logarithm of each count obtained from a minimum of 20 duplicate/replicate pairs. This mean value is multiplied by 3.27 to obtain the final control limit. Once the control limit is determined, the logarithmic range for each ongoing duplicate/replicate pair is determined and must be  $<$  control limit value. Specific information used for control limits for each individual EMLAP test method are provided in Table 5-1.



The lab determines **measurement uncertainty** associated with Spore Trap Analysis by using the Type (A) methodology. QC reference slides are used that have varying spore count levels. 30 data points are used for each QC slide. From these counts the Mean and Standard Deviation are determined. Then the Coefficient of Variation (CV) is calculated for each set of data by dividing the standard deviation by the mean. Then the pooled CV is calculated by adding the squares of the CV values, averaging them and taking the square root. The expanded **Measurement Uncertainty** (MU) is calculated by multiplying the pooled CV value by the appropriate coverage factor k. For a confidence level of 95%, k is approximately 2 for a data set of 30 points or more. This RSD value is then multiplied by the calculated or observed value of the sample to be expressed as a **measurement uncertainty**. When reporting results for expanded Measure of uncertainty the test results and the expanded **measurement uncertainty** are expressed in the same units.

Example with a calculated CV pooled of 0.114:

Expanded MU @ 95% C.L. (k=2) equals  $CV_{pooled} (.114) \times 2 = 0.23$  (23% RSD)

Bias cannot be determined. No quantitative reference material available

Example analytical uncertainty for air sample with 500 spores/m<sup>3</sup>:

Expanded analytical uncertainty = 500 spores/m<sup>3</sup> X 0.23 = 115 spores/m<sup>3</sup>

Example of reporting for air sample with 500 spores/m<sup>3</sup>:

500 spores/m<sup>3</sup> with an analytical uncertainty of +/- 115 spores/m<sup>3</sup> at the 95% confidence level

12.11.3.5 Qualitative Fungal Analysis for reporting under the EMLAP Program. In order to monitor consistency with regard to genus/species identification, acceptability criteria for taxon identification and taxon abundance ranking are described below. These are laboratory determined; interim criteria as no regulatory guidance or method specified criteria are available.

12.11.3.5.1 Taxon identification acceptability: On the replicate and duplicate analyses, daily reference slide analyses, monthly reference culture analyses and round robin study analyses with at least 3 different organisms present, 60% of all genus/species of fungi and/or genus/group of fungi identified on the original sample at levels >10x LOD should also be identified on the recount.

12.11.3.5.2 Taxon abundance ranking acceptability: On the replicate and duplicate analyses, daily reference slide analyses and round robin study analyses, the top three genus/species of fungi and/or genus/group of fungi by abundance and >10x LOD will be ranked. The recount data should identify these same fungi for the identification to be considered acceptable.

12.11.3.5.3 Consistent fungal ID is also monitored through participation in the Direct Exam Fungal Analysis PT programs administered by EMLAP. Acceptability limits are currently set at 85% correct identification by AIHA LAP.

12.11.3.5.4 It should also be recognized that other, non-quantifiable factors may also add additional uncertainty. These factors may include media selection, organism competition, etc. and are not directly measurable.

12.11.4 The reporting procedure.

Typically, measurement uncertainty is reported per the client's request or when the *known compliance* to a specification limit is affected. The result and the expanded measurement uncertainty are reported in the same units. Both the result and expanded measurement uncertainty will be rounded to the same number of significant figures.

#### 12.11.4.1 Reporting test results the Expanded Measurement Uncertainty

When the reporting of uncertainty is required or requested by a client to be included in the analytical report, the test result and the expanded measurement uncertainty will be reported in the same units. The test result and the expanded measurement uncertainty should both be rounded in a similar manner, meaning the same number of significant figures.

A description of the coverage factor should be included as in the following example:

Total Lead in Air concentration of 50 ug/sample  $\pm 5.3$  ug/sample at 95% confidence level (k=2)

Where bias is present, report it along with the uncertainty as a probable bias such as:

Total Lead in Air concentration of 50 ug/sample  $\pm 5.3$  ug/sample at 95% confidence level (k=2)

This method has an average recovery of 99 %, or a probable bias of -0.5 ug/sample.

An example template for the expanded measurement uncertainty calculation is in Table 12-2.

Table 12-1 Contributors to Measurement Uncertainty (Applicable AIHA LAP methods SW700B, N7082, N7300, and N7303)

Example of Contributors to Measurement Uncertainty Chemical Analyses of Lead (Pb) using ICP-EETSE Atlanta and FAA See Example Calculations (to the right of the table)

| Contributors to Uncertainty                       | Representative and Applicable QC Data | Comments to Clarify Contributor Effects                                                                                 |
|---------------------------------------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>Transportation/Storage/Handling</b>            |                                       |                                                                                                                         |
| shipping time, container & temperature            | NA                                    | No impact on bulk paint samples from transportation, storage or normal handling                                         |
| lab storage time, conditions & temperature        | NA                                    |                                                                                                                         |
| contamination in lab storage areas                | NA                                    |                                                                                                                         |
| <b>Laboratory Subsampling</b>                     |                                       |                                                                                                                         |
| sample nonhomogeneity                             | DUP                                   | Sample composition, etc.                                                                                                |
| blending techniques                               | DUP                                   | Stirring, sieving, grinding, etc.                                                                                       |
| sample size                                       | DUP                                   | Large enough to allow adequate subsampling                                                                              |
| <b>Sample Preparation:</b>                        |                                       |                                                                                                                         |
| volumetric glassware                              | LCS, DUP                              | NA for Class A; applies for graduated tubes or cylinders, etc.                                                          |
| dispensing device                                 | LCS, DUP                              | pipettes, and other types of dispensers not Class A                                                                     |
| balance                                           | LCS, DUP                              | balance error is often insignificant compared to other MU sources                                                       |
| temperature                                       | LCS, DUP                              | Hot plate or ashing temperatures                                                                                        |
| sample extraction                                 | LCS, DUP                              | Applies to LCS or DUP if goes through sample preparation                                                                |
| extractant background                             | LCS, DUP, MB                          | Analyte or interferant in acids, or other reagents                                                                      |
| <b>Lab Environmental Conditions:</b>              |                                       |                                                                                                                         |
| temperature variance                              | NA                                    | No impact on bulk paint samples                                                                                         |
| humidity variance                                 | NA                                    | No impact on bulk paint samples                                                                                         |
| <b>Analysts:</b>                                  |                                       |                                                                                                                         |
| different analysts                                | LCS, DUP                              | Analyst contributors affect all aspects of analysis from subsampling through data manipulation                          |
| analyst training level & experience               | LCS, DUP                              |                                                                                                                         |
| data interpretation by analyst                    | LCS, DUP                              |                                                                                                                         |
| <b>Measuring Instruments:</b>                     |                                       |                                                                                                                         |
| instrument stability                              | LCS                                   | Baseline drift, repeatability of averaged readings, etc.                                                                |
| carry over effects                                | LCS, DUP                              | Impact of high samples on following sample readings; can be monitored by proper use of CCBs                             |
| day to day calibration differences                | LCS                                   |                                                                                                                         |
| interferences                                     | DUP, MS                               | Due to matrix, inter-element effects, etc. Cannot be routinely determined for typical industrial hygiene sampling media |
| <b>Calibration Standards/Reference Materials:</b> |                                       |                                                                                                                         |
| preparation variances                             | LCS, DUP                              | Due to analysts, balances, dispensing devices used, etc.                                                                |
| calibration stock material uncertainty            | CERTIFICATE                           | Obtain from certificate or estimate                                                                                     |
| LCS reference material uncertainty                | NA                                    | Sample results not corrected for LCS recovery                                                                           |

| Test Procedure Variations                                         |     |                                                                              |
|-------------------------------------------------------------------|-----|------------------------------------------------------------------------------|
| variation within and between reagent lots                         | LCS | Similar to extractant background effects under Sample Preparation above      |
| extraction or digestion times and temps                           | LCS | May affect complete dissolution of analyte or loss of material in some cases |
| sample dependent modifications                                    | LCS | Changes in conditions due to sample size, customer requests, etc             |
| desorption efficiencies within and between lots for sorbent tubes | NA  |                                                                              |
| Data Manipulation:                                                |     |                                                                              |
| sampling media blank correction                                   | NA  | No sampling media with bulk samples                                          |
| instrument blank correction                                       | LCS | when allowed                                                                 |
| Accuracy of calculations                                          | LCS | Manual, spreadsheet, LIMS, etc                                               |

DUP = Duplicate, resulting from sub-sampling of a bulk (NOTE: NOT LCS/LCSD duplicate spiked sampling media)

FB = Field Blank

FS = Field Spike

LCS = Laboratory Control Sample, matrix matched and typically taken through the entire analytical process, with each sample batch

MB = Method or matrix blank

NA = Not Applicable

Table 12-1 Contributors to Measurement Uncertainty (AIHA LAP, LLC methods Air SOPs MB-15019, MB-15022, MB-15028; Bulk SOPs MB-15020; and Surface Direct (SOP MB-15020) Exam

**Example Contributors to Measurement Uncertainty – Direct Air Environmental Microbiology Analyses**  
(representative list - may not include of all contributors)  
(QC sample types in this list are typical of those utilized in AIHA LAP laboratories)  
See Example Calculations (to the right of the table) and tabbed sheets for additional examples

| Contributors to Uncertainty                     | Representative and Applicable QC Data | Comments to Clarify Contributor Effects                                                                                                                                                       |
|-------------------------------------------------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Temperature, Storage, Handling:</b>          |                                       |                                                                                                                                                                                               |
| shipping time, container & temperature          | NA                                    | No impact on direct air exam samples                                                                                                                                                          |
| lab storage time, conditions & temperature      | NA                                    | No impact on direct air exam samples                                                                                                                                                          |
| contamination in lab storage areas              | NA                                    | No impact on direct air exam samples                                                                                                                                                          |
| <b>Laboratory Subsampling:</b>                  |                                       |                                                                                                                                                                                               |
| sample nonhomogeneity                           | NA                                    | Not applicable to direct air exam samples                                                                                                                                                     |
| blending techniques                             | NA                                    | Not applicable to direct air exam samples                                                                                                                                                     |
| sample size                                     | NA                                    | Not applicable to direct air exam samples                                                                                                                                                     |
| <b>Sample Preparation:</b>                      |                                       |                                                                                                                                                                                               |
| slides & coverslip contamination                | MB                                    | With proper care there should be no contamination of daily blanks; therefore, no impact                                                                                                       |
| mounting medium                                 | MB                                    | With proper care there should be no contamination of daily blanks; therefore, no impact                                                                                                       |
| <b>Lab Environmental Conditions:</b>            |                                       |                                                                                                                                                                                               |
| seasonal background spore variances             | MB                                    | Samples are not exposed to air for any length of time; therefore there should be no impact                                                                                                    |
| <b>Analysts:</b>                                |                                       |                                                                                                                                                                                               |
| different analysts                              | RS                                    | Reference slides analyzed by multiple analysts                                                                                                                                                |
| analyst training level & experience             | RS                                    | Reference slides analyzed by multiple analysts                                                                                                                                                |
| data interpretation by analyst                  | RS                                    | Reference slides analyzed by multiple analysts                                                                                                                                                |
| <b>Measuring Instruments:</b>                   |                                       |                                                                                                                                                                                               |
| microscope magnification level used             | RS                                    | Reference slides analyzed with multiple microscopes                                                                                                                                           |
| eye piece graticule & field of view calibration | RS                                    | Reference slides analyzed with multiple microscopes                                                                                                                                           |
| <b>Test Procedure Variations:</b>               |                                       |                                                                                                                                                                                               |
| portion and fields of sample analyzed           | RS                                    | Varies by analyst                                                                                                                                                                             |
| microbial density                               | RS                                    | High concentrations or clumps of spores may impact results                                                                                                                                    |
| interferences                                   | RS                                    | Debris level and resolution of spores in field of view                                                                                                                                        |
| ranges (high, medium, low)                      | RS                                    | Uncertainty may be concentration dependent. Lab should evaluate this as part of method validation.                                                                                            |
| <b>Data Manipulation:</b>                       |                                       |                                                                                                                                                                                               |
| reading, interpreting & reporting results       | RS                                    |                                                                                                                                                                                               |
| Accuracy of calculations                        | RS                                    | Manual, spreadsheet, LIMS, etc                                                                                                                                                                |
| area or air volume sampled                      | NA                                    | Typically provided by the customer. This is not part of analytical uncertainty, but must be considered by labs providing sampling and providing combined sampling and analytical uncertainty. |

MB = Daily method blank  
RS = Daily reference slides

Please note that the original column I (CV of the pair) of the “culturable analyses” tabbed worksheet had a formula incorrectly entered. The worksheet has been corrected and any affected values have been highlighted in yellow.

Table 12-2 Expanded Measurement Uncertainty Calculation Template

Examples of Analytical Measurement Uncertainty for Metals in Air

Metals in Air using hotblock acid digestion and ICP-EETSE Atlanta

Analysis by NIOSH 7300M/7303 Target LCS Recovery of Lead in Air EETSE Atlanta 18434 at 50.0 +/- 0.40 ug, Total

Sample duplicate data in ug, Total for Metals in Air using hotblock acid digestion and ICP-EETSE Atlanta by NIOSH 7300M/7303

Lead

| LCS ug, Total | True value ug, Total | LCS % Rec | ug, Total LCS | ug, Total LCSD | Std Dev (S) | CV     | CV2    |
|---------------|----------------------|-----------|---------------|----------------|-------------|--------|--------|
| 51.9          | 50.0                 | 103.8     | 51.9          | 52.9           | 0.7071      | 0.0135 | 0.0002 |
| 49.6          | 50.0                 | 99.2      | 49.6          | 48.7           | 0.6364      | 0.0129 | 0.0002 |
| 48.5          | 50.0                 | 97.0      | 48.5          | 50.6           | 1.4849      | 0.0300 | 0.0009 |
| 49.2          | 50.0                 | 98.4      | 49.2          | 48.2           | 0.7071      | 0.0145 | 0.0002 |
| 50.9          | 50.0                 | 101.8     | 50.9          | 51.7           | 0.5657      | 0.0110 | 0.0001 |
| 51.4          | 50.0                 | 102.8     | 51.4          | 47.7           | 2.6163      | 0.0528 | 0.0028 |
| 47.4          | 50.0                 | 94.8      | 47.4          | 47.1           | 0.2121      | 0.0045 | 0.0000 |
| 47.2          | 50.0                 | 94.4      | 47.2          | 49.8           | 1.8385      | 0.0379 | 0.0014 |
| 47.6          | 50.0                 | 95.2      | 47.6          | 47.8           | 0.1414      | 0.0030 | 0.0000 |
| 50.0          | 50.0                 | 100.0     | 50.0          | 50.4           | 0.2828      | 0.0056 | 0.0000 |
| 50.2          | 50.0                 | 100.4     | 50.2          | 50.8           | 0.4243      | 0.0084 | 0.0001 |
| 47.1          | 50.0                 | 94.2      | 47.1          | 46.8           | 0.2121      | 0.0045 | 0.0000 |
| 48.3          | 50.0                 | 96.6      | 48.3          | 46.0           | 1.6263      | 0.0345 | 0.0012 |
| 46.3          | 50.0                 | 92.6      | 46.3          | 48.2           | 1.3435      | 0.0284 | 0.0008 |
| 45.8          | 50.0                 | 91.6      | 45.8          | 49.1           | 2.3335      | 0.0492 | 0.0024 |
| 51.0          | 50.0                 | 102.0     | 51.0          | 53.1           | 1.4849      | 0.0285 | 0.0008 |
| 47.9          | 50.0                 | 95.8      | 47.9          | 47.7           | 0.1414      | 0.0030 | 0.0000 |
| 55.8          | 50.0                 | 111.6     | 55.8          | 55.4           | 0.2828      | 0.0051 | 0.0000 |
| 47.8          | 50.0                 | 95.6      | 47.8          | 49.3           | 1.0607      | 0.0218 | 0.0005 |
| 50.3          | 50.0                 | 100.6     | 50.0          | 49.9           | 0.0707      | 0.0014 | 0.0000 |
| 52.6          | 50.0                 | 105.2     | 52.6          | 49.0           | 2.5456      | 0.0501 | 0.0025 |
| 49.8          | 50.0                 | 99.6      | 49.8          | 49.2           | 0.4243      | 0.0086 | 0.0001 |
| 48.5          | 50.0                 | 97.0      | 48.5          | 51.8           | 2.3335      | 0.0465 | 0.0022 |
| 50.2          | 50.0                 | 100.4     | 50.2          | 47.2           | 2.1213      | 0.0436 | 0.0019 |
| 49.2          | 50.0                 | 98.4      | 49.2          | 49.8           | 0.4243      | 0.0086 | 0.0001 |
| 52.2          | 50.0                 | 104.4     | 52.2          | 49.2           | 2.1213      | 0.0418 | 0.0018 |
| 48.1          | 50.0                 | 96.2      | 48.1          | 48.2           | 0.0707      | 0.0015 | 0.0000 |
| 49.2          | 50.0                 | 98.4      | 49.2          | 47.8           | 0.9899      | 0.0204 | 0.0004 |
| 48.1          | 50.0                 | 96.2      | 48.1          | 46.7           | 0.9899      | 0.0209 | 0.0004 |
| 52.7          | 50.0                 | 105.4     | 52.7          | 48.4           | 3.0406      | 0.0601 | 0.0036 |

|                      |      |  |  |  |  |                                         |        |
|----------------------|------|--|--|--|--|-----------------------------------------|--------|
| 30 point Mean % Rec. | 99.0 |  |  |  |  |                                         |        |
| 30 point Std Dev RSD | 4.4  |  |  |  |  |                                         |        |
|                      | 4.4% |  |  |  |  |                                         |        |
|                      |      |  |  |  |  | $\sum CV^2$                             | 0.0246 |
|                      |      |  |  |  |  | $CV_{pooled} = \sqrt{(\sum CV^2/30)} =$ | 0.0287 |

$$\text{Combined Rel. Std Dev (SDc)} = \sqrt{SD^2 + SD^2} = 2.87\% \quad \text{RSD}$$

$$SDc = \sqrt{(4.4)^2 + (2.87)^2} = 5.25\%$$

$$\text{Expanded MU @ 95\% Conf (k=2)} = 10.5\%$$

$$\text{Bias @ 99.0\% Rec of LCS} = -1.0\%$$

Example analytical uncertainty for 50 ug, Lead in Air sample:

Expanded analytical uncertainty of 50 ug, Lead in Air = 50 X 0.105 = 5.25 ug, Total

Bias = 50 ug, Total X -0.010 = 0.500 ug, Total

Example of reporting for 50 ug, Total of Lead in Air:

50 ug, Total of Lead in Air with an analytical uncertainty of +/- 5.3 ug, Total at the 95% confidence level and a probable bias of -0.50 ug, Total



Table 12-3  
Estimation of Uncertainty Requirements for non AIHA LAP

| Method                                        | Uncertainty Based On |
|-----------------------------------------------|----------------------|
| E120.1 Conductivity                           | Method Limits        |
| E160.4 VS                                     | NA                   |
| E180.1 Turbidity                              | Method Limits        |
| E200.7 ICP EETSE Atlanta Metals               | Method Limits        |
| E200.8 ICP MS Metals                          | Method Limits        |
| E245.1 Mercury                                | Method Limits        |
| E300.0 Anions by IC                           | Method Limits        |
| E350.1 Ammonia                                | Method Limits        |
| E351.2 TKN                                    | Method Limits        |
| E353.2 Nitrate Nitrite                        | Method Limits        |
| E365.1 Ortho Phosphorus                       | Method Limits        |
| E365.1 Total Phosphorus                       | Method Limits        |
| E410.4 COD                                    | Method Limits        |
| E420.1 Total Phenolics                        | Method Limits        |
| E420.4 Total Phenolics                        | Method Limits        |
| E615 Herbicides                               | Historical Limits    |
| E624.1 VOCs                                   | Method Limits        |
| E625.1 SVOCs                                  | Method Limits        |
| E1664B Oil and Grease TPH                     | Method Limits        |
| NECi N07-0003 Nitrate-Nitrite                 | Method Limits        |
| FL-PRO                                        | Method Limits        |
| RSK-175 Dissolved Methane, Ethane, Ethene     | Method Limits        |
| SM2120B-2011 Color                            | NA                   |
| SM2120F-2011 Color ADMI                       | NA                   |
| SM2310B-2011 Acidity                          | NA                   |
| SM2320B-2011 Alkalinity                       | Method Limits        |
| SM2340B-2011 Hardness                         | Method Limits        |
| SM2540B-2015 TS                               | NA                   |
| SM2540C-2015 TDS                              | NA                   |
| SM2540D-2015 TSS                              | NA                   |
| SM2540F-2015 Settleable Solids                | NA                   |
| SM2540G-2015 Total, Fixed and Volatile Solids | NA                   |
| SM3500CrB-2011 Hexavalent Chromium            | Method Limits        |
| SM3500FeB-2011 Ferrous Iron                   | Method Limits        |
| SM4500ClG-2011 Total Residual Chlorine        | Method Limits        |
| SM4500CNG-2016 Amenable Cyanide               | Method Limits        |
| SM4500CNE-2016 Total Cyanide                  | Method Limits        |
| SM4500H <sup>+</sup> B-2011 pH                | NA                   |
| SM4500OH-2016 Dissolved Oxygen                | NA                   |
| SM4500S2F-2011 Sulfide                        | Method Limits        |

| Method                               | Uncertainty Based On |
|--------------------------------------|----------------------|
| SM4500SO3B-2011 Sulfite              | NA                   |
| SM5210B-2016 BOD                     | Method Limits        |
| SM5210B-2016 CBOD                    | Method Limits        |
| SM5310B-2014 TOC                     | Method Limits        |
| SM5540C-2011 MBAS Surfactants        | Method Limits        |
| SM10200H-2011 Chlorophyll            | Historical Limits    |
| SM9222B-2015 Total Coliforms         | NA                   |
| SM9222D-2015 Fecal Coliforms         | NA                   |
| SM9223B-2016/QUANTI-TRAY E.Coli      | NA                   |
| SW1010 Flash Point                   | NA                   |
| SW1030 Ignitability                  | NA                   |
| SW1311 TCLP                          | Historical Limits    |
| SW1312 TCLP                          | Historical Limits    |
| SW6010 ICP EETSE Atlanta Metals      | Method Limits        |
| SW6020 ICP MS Metals                 | Method Limits        |
| SW7.3 Reactive Cyanide               | Method Limits        |
| SW7.3 Reactive Sulfide               | Method Limits        |
| SW7196 Hexavalent Chromium           | Method Limits        |
| SW7470 Mercury in Water              | Method Limits        |
| SW7471 Mercury in Soils              | Method Limits        |
| SW7473 Mercury in Soils              | Method Limits        |
| SW8011 EDB DBCP                      | Historical Limits    |
| SW8015 DAI                           | Historical Limits    |
| SW8015 DRO                           | Historical Limits    |
| SW8015 GRO                           | Historical Limits    |
| SW8081 Pesticides                    | Historical Limits    |
| SW8082 PCBs                          | Historical Limits    |
| SW8151 Herbicides                    | Historical Limits    |
| SW8260 VOCs                          | Historical Limits    |
| SW8270 SVOCs                         | Historical Limits    |
| SW8310 PAHs                          | Historical Limits    |
| SW8315 Formaldehyde and Acetaldehyde | Historical Limits    |
| SW9010 9012 Cyanide                  | Method Limits        |
| SW9010 9014 Cyanide                  | Method Limits        |
| SW9030 9034 Sulfide                  | Method Limits        |
| SW9038 Sulfate                       | Method Limits        |
| SW9040 pH in Water                   | NA                   |
| SW9041 pH by Paper                   | NA                   |
| SW9045 pH in Soil                    | NA                   |
| SW9050 Conductivity                  | Method Limits        |
| SW9056 Anions by IC                  | Method Limits        |
| SW9060 TOC                           | Method Limits        |
| SW9065 Total Phenolics               | Method Limits        |

| Method                              | Uncertainty Based On |
|-------------------------------------|----------------------|
| SW9070 Oil and Grease TPH in Water  | Method Limits        |
| SW9071 Oil and Grease TPH in Soils  | Method Limits        |
| SW9095 Free Liquids by Paint Filter | NA                   |
| TO-14A, TO-15                       | Method Limits        |

## 12.12 Recommended Storage Conditions

The locations for the storage of all standards, reagents, and working solutions are based upon compatibility of the material with other materials, flammability, and intended use of the material.

The following general guidelines apply to the storage of standards and reagents.

12.12.1 The locations for the storage of all standards, reagents, and working solutions are based upon compatibility of the material with other materials, flammability, and intended use of the material. The following general guidelines apply to the storage of standards and reagents.

12.12.2 The recommended storage conditions are included in the chemical inventory of LIMS when adding information pertaining to new standards and reagents.

12.12.3 Each department maintains storage locations for standards, reagents, working solutions, and samples. Department supervisors ensure that all chemicals are properly kept. Department supervisors periodically audit storage areas for possible hazards and violations.

12.12.4 Samples are never stored in the same location as standards or reagents.

12.12.5 The following major categories of chemicals, compressed gases, and samples determine standard and reagent storage conditions in the laboratory:

12.12.5.1 Flammables

12.12.5.2 Oxidizer

12.12.5.3 Acids

12.12.5.4 Bases

12.12.5.5 Compressed flammable gas cylinders

12.12.5.6 Compressed non-flammable gas cylinders

12.12.5.7 VOC Samples

12.12.5.8 Inorganic and SVOC Samples

12.12.6 The certificate of analysis or Material Safety Data Sheet provides relevant information regarding recommended storage conditions for all standards and reagents.

## 12.13 Handling Standards and Reagents

12.13.1 Safety glasses and latex type gloves must be worn at all times when handling chemicals, samples, standards or reagents. A lab coat is also highly recommended. Closed-toe shoes and clothing that cover the legs (no shorts or dresses) must be worn whenever an analyst is working in the lab.

12.13.2 The toxicity or carcinogenicity of each reagent used in the laboratory has not been fully established. Each chemical should be regarded as a health hazard and exposure to it should be kept as low as reasonably possible. All health and safety concerns for these and any other chemicals are listed in the Material Safety Data Sheets (MSDS) provided by the supplier or

manufacturer of these chemicals. A copy of any MSDS is available for review at any time in notebooks maintained in the Sample Receiving Department.

12.13.3 Proper disposal of all wastes is essential. Containers are provided for all waste according to the type. Follow the waste disposal guidelines found in Section 17.0 for disposing of chemicals.

### 12.14 Record Keeping Definitions

12.14.1 Prep Log: A prep log is defined as a log of the preparation process that is applied to samples before they are analyzed. This log includes initial volume/weight, final volume, date prepped, batch number, spike amount, all spike information and any comments pertaining to the sample preparation.

12.14.2 Back Log Report: A backlog report is defined as a list of all the samples that need to be analyzed for a specific department. This list is generated from the LIMS system. The list is used by each department manager to create a batch for analysis.

12.14.3 Extraction or Digestion Log: An extraction or digestion log is defined as a log of samples that are either extracted or digested for subsequent analysis. This log includes initial volume/weight, final volume, date prepped, batch number, spike amount, all spike information and any comments pertaining to the sample preparation.

### 12.15 Procedures for Record Keeping

12.15.1 The record keeping system allows for historical reconstruction of all laboratory activities that produced the analytical data. All raw data (including Quality Control information) from the instrumentation is both posted to the laboratory archive system, referred to as the "Portal Server", and backed up weekly by the IT Department. In addition, instrument sequences are posted to the portal server by instrument, year, month, and sequence. Prep log sheets are posted by batch number, while logbooks are additionally scanned and posted by the QA Department as a backup copy. In addition, electronic data associated with each instrument is periodically stored off site.

12.15.1.4 Project Management: Each project manager has a project folder with the COC and sample receipt checklist (SRCL) in their office until the project is completed. Once the project is completed, either a hardcopy or PDF file of the report and invoice are printed, along with a cover letter and case narrative (if necessary). If everything is correct, the project is reported to the client via email or hardcopy mailing. The PDF files of the COC, Sample Receiving Checklist and invoice are posted to the portal server by work order number, year, and month. Any revisions are posted in the same folder with the revision having "REVISION" in the file name. **The reason for the change needs to be documented in the narrative.** If the client requires an Electronic Disc Deliverable (commonly referred to as an EDD) or a Data Package, this information is also posted on the Portal Server. Reports are kept for five years.

12.15.1.5 LIMS System: The LIMS system holds all the information relevant to each project that is received at the laboratory, including all client information, and prep and analysis information for each test performed. LIMS data is backed up daily onto CDs. Copies are stored both on and off site.

12.15.1.6 Entries in manually recorded records are not obliterated by methods such as erasures, overwriting, whiteout or markings. All corrections to record-keeping errors are made by one line marked through the error. The individual making the correction initials and dates the correction.

12.15.1.7 Corrections to electronic records are made by a manual notation that indicates the change to the record. This notation is kept with the affected record.

## 12.16 Record Storage

- 12.16.1 All records for each project that is received at the laboratory must be held for a minimum of five years (also, now 5 years for lead analysis records per AIHA LAP). Final reports are maintained electronically on computer hard drives and daily back-up tapes.
- 12.16.3 Electronic records are stored by department on the laboratory's portal server after scanning or converting the documentation to a PDF file format using Adobe Acrobat®. Customer Service stores the client reports by work order number. Laboratory data is downloaded and stored by department (Asbestos, Inorganic Chemistry, Metals, Microbiology, Sample Prep, Semi-Volatile Organics, Volatile Organics, and Wet Chemistry). Data contained in the Laboratory Information Management System (LIMS) and on other servers is backed up daily onto CDs. There is also a second server that contains a duplicate of this information.
- 12.16.4 Archive areas are protected against fire, theft, loss, environmental deterioration and vermin. Electronic records are also protected from electronic or magnetic sources. Access to recent records is limited and maintained by logon and password. In addition, a portion of the portal server has been designated specifically as an "Archive area". These Archive areas house information that is older and has additional access restrictions. Archive areas are regularly inspected as part of the Internal Audit program. Representatives of an accrediting authority may have access to archived information.
- 12.16.5 In the event that EETSE Atlanta, Inc. transfers ownership, the new proprietors retain sole custody and responsibility for all records. If EETSE Atlanta were to close, records shall be maintained at a commercial archive facility or maintained by another laboratory within the network. Records may also be transferred back to clients, if requested.

## 12.17 Quality Assurance Records

Where necessary, records are generated and maintained for all quality associated activities conducted during all phases of the analytical work. QA records provide sufficient evidence that all specified QA requirements have been accomplished and satisfied and provide sufficient documentation to substantiate all reported findings and conclusions. These records are retained by EETSE Atlanta, Inc. after the initial issuance of the report for a minimum of five years in accordance with AIHA LAP and TNI requirements. This ensures the availability of the QA historical information. The following types of records shall be identifiable and retrievable:

- 12.17.1 General QA Records - Records pertaining to procurement activities; results of reviews & audits; qualifications of personnel; Standard Operating Procedures and Document Control Records.
- 12.17.2 Inspection and Test Data Records - Records pertaining to in-process inspection and tests, Equipment Logs and Maintenance Logbooks.
- 12.17.3 Generated raw data, reports, etc.

## 13.0 CORRECTIVE ACTION AND NON-CONFORMANCES

Deficiencies or non-conformances in analytical procedures, materials, components or methodology may lead to the release of incorrect analytical results to the customer. Once a deficiency or non-conformance has been identified, corrective actions must be implemented to insure proper data qualification and narration on the final client report and, when possible, prevent the deficiency being repeated. To document and track the non-conformance, a Corrective Action Report (CAR) is issued through the LIMS system. An example of a Corrective Action Report is contained in [Appendix VI](#).

- 13.1 Standard Procedure for Defining, Implementing, and Closing a Corrective Action Report (CAR).
  - 13.1.1 Non-conformance: A non-conformance is defined as any situation that is either outside acceptable limits (data) or does not comply with the procedure/method in some way (preservation, matrix, etc.). The following are examples of situations considered non-conformances for which the completion of a CAR report is required.
    - 13.1.1.1 Contamination in the Blank: The presence of target analytes in the blank that are above the reporting limit or in some cases, the MDL.
    - 13.1.1.2 Failing Laboratory Control Sample (LCS): When the percent recoveries of target analytes in an LCS fail to meet the acceptable limits for an analysis.
    - 13.1.1.3 Failing Matrix Spike (MS): When the percent recovery of a target analyte in a MS fails to meet the acceptable limits of analysis.
    - 13.1.1.4 Failing Duplicate: When the relative percent difference (RPD) of results between two aliquots of the sample exceed the maximum allowable RPD.
    - 13.1.1.5 Improper sample preservation: When a sample does not have the correct preservation (usually this involves temperature or pH).
    - 13.1.1.6 Exceeding EPA recommended holding time: When a sample is prepared (extracted or digested) and or analyzed after holding time has expired.
    - 13.1.1.7 Sample integrity has been compromised: When a sample container is broken, is improperly sealed, is inappropriate for the analysis, or has headspace (volatiles).
    - 13.1.1.8 Surrogates/Internal standards fail (organic analysis): When a surrogate(s) or internal standard fails to meet the acceptable quality control limits associated with the test method.
    - 13.1.1.9 Dilution test (metals analysis): When the sample dilution test fails to meet the acceptable quality control limits associated with the test method.
    - 13.1.1.10 Failure to meet batch requirements (insufficient sample volume for MS/MSD, etc.)
    - 13.1.1.11 Poor chromatography or missing analytes.
    - 13.1.1.12 Expired standards and reagents.
    - 13.1.1.13 Failed Proficiency Test (PT) analyte.
  - 13.1.2 Procedure for the issuing, completing, and closing of an analytical or technical related CAR.
    - 13.1.2.1 When a non-conformance occurs, the employee performing the work, the initial data reviewer, a Project Manager, or the Department Manager must issue a CAR in the LIMS system as indicated below.
      - 13.1.2.1.1 From the "Categories" menu select "Quality Control". Then from the "Options" menu select "Corrective Action Reports".
      - 13.1.2.1.2 Click "Add" and the LIMS will create a new CAR and automatically number it. Fill in the fields for "Department", "Instrument ID", "Batch ID", "Initiated By" and "Initiated On" as appropriate.
      - 13.1.2.1.3 Fill in the "Summary" field with a brief description of the non-conformance.



- 13.1.2.1.4 Fill in the “Complete Description of Non-conformance” field with a detailed description of the non-conformance including batch numbers, affected samples by number, recoveries and control limits if applicable, etc.
- 13.1.2.1.5 The complete data file or log book is then forwarded to the Dept. Manager for review. This file must include raw data, prep information, review checklists, etc. and a reference to the CAR by number.
- 13.1.2.1.6 The Dept. Manager brings the Corrective Action Report to the Laboratory Manager, who determines whether the non-conformance is a “deficiency” or “anomaly”. An anomaly is an occurrence that affects only the group of data in the associated batch or sequence. Human errors or mistakes are usually anomalies. A deficiency is an occurrence that is system related and may affect more than the batch and may require more extensive corrective actions which could include retraining, replacing equipment, revising SOPs, etc. If the CAR is anomaly, the Department Manager is instructed to document required corrective action in the “Corrective Action Required” field. If the CAR is a deficiency, enter a statement in the “Corrective Action Required” section that the CAR will be forwarded to the QA Manager for review. The QA Manager performs an investigation and documents the root cause investigation in the “Corrective Action Required” section of the CAR form. Monitoring requirements of actions and the need for additional audits are also documented in this section. If no root cause investigation is required, the QA Manager may instead comment with a “QA Statement”. When the QA Manager completes the review, the CAR is closed or Laboratory Manager or Technical Director is notified to review the data and perform the required corrective action (which is documented in the “Corrective Action Required” field).
- 13.1.2.1.7 These corrective actions may include narrating the non-conformance to the affected jobs, sending affected samples to be re-prepped and/or reanalyzed, performing instrument maintenance, etc. Non-conformances may also be referred directly to the QA Dept. for more extensive action if necessary. The person filling in the “Corrective Action Required” field then fills in the “Completed By” and “Date” fields.
- 13.1.2.1.8 If the non-conformance is determined to be an anomaly, the Dept. Manager completes the “CAR Closed By” and “Date” fields at the end of the CAR form.
- 13.1.2.1.9 If the non-conformance is determined to be a deficiency, full QA review and documented corrective action to prevent recurrence is required. A root cause will be identified for deficiencies. Root cause analysis typically addresses those issues which historically have been addressed again and again with quick fixes but it may also be applied in those instances where a process or methodology is affected. Working harder and faster on the same items does not increase efficiency. Root cause analysis allows one to think through the problem and address the causes rather than its effects. By eliminating the root cause, time and money are saved.  
 Steps for a root cause analysis include:
  1. Identifying the problem. You must define the problem accurately to address the true root cause.
  2. Understand the problem. Check the data regarding the problem to gain a clear understanding of the underlying issues. This can be accomplished by using several root cause analysis techniques such as brainstorming, use of control charts, or the “5 Whys” technique.

## Environment Testing

- a. With the Brainstorming technique, ideas are collected from people associated with problem. All ideas should be considered and more is better because of not knowing what might work. Brainstorming utilizes a set time limit. Discussion about the ideas takes place after brainstorming is complete. Those involved build on the ideas to resolve the root cause.
  - b. Control Charts can be used to study trends associated with data over time to draw conclusions as to whether a process is consistent (within defined limits) or is unpredictable (outside of defined limits). Where applicable, control charts can pinpoint when a problem started and/or stopped.
  - c. “5 Whys” refers to the practice of asking, 5 times, why the failure has occurred in order to get to the root cause of the problem. Each “Why” brings one closer and closer to the root cause. It should be noted that sometime more or less “Whys” are required to get to the root cause. The use of five is a guide.
3. Corrective Action. Determine the probable underlying cause(s) of the problem. Take corrective action(s) to eliminate the causes.

Root causes will be categorized as one of the following: personnel, (LIMS) database, Quality Control, procedure, or laboratory controls.

- 13.1.2.1.9.1 Personnel: Root causes attributed to personnel may require training or retraining to insure individuals understand their responsibilities in the process.
- 13.1.2.1.9.2 Database: A Root cause from a database issue primarily refers to the Laboratory Information Management System (LIMS). This type of nonconformance will require the database to be updated. This may include method information (test codes), client information, project information, login entries, calculations, audit trail, and reports among others. Database root cause will also include individual instrument databases and software (GCs, ICPs, AA, Lachat autoanalyzers, etc.)
- 13.1.2.1.9.3 Quality Control: QC root causes result from incorrect QC acceptance ranges in logbooks, LIMS or are the result of trend changes. These will be reviewed and updated as necessary.
- 13.1.2.1.9.4 Procedure: This root cause covers procedures, policies, checklists, standard operating procedures (SOPs) that will be reviewed for modifications.
- 13.1.2.1.9.5 Laboratory Controls: Root causes from instrumentation, software and equipment will be investigated. These may require maintenance, repair, or updates.
- 13.1.2.1.9.6 A deficiency may require halting analysis on the affected test, notifying clients when previous data may have been affected or other significant corrective actions.
- 13.1.2.1.10 Once the required corrective actions associated for a deficiency have been completed, fully documented and systems deemed back in control the QA Dept or Technical Director will close the CAR and affected procedure may again be used. The CAR is then printed out, signed by the Technical Director or QA Manager, placed with the data and scanned and posted to the portal server.
- 13.1.2.1.11 The Technical Director, QA Manager, or any employee may determine that a potential nonconformance requires a preventive action report. Preventive actions are potential sources of nonconformance and needed improvements. “Preventive Action

Report” can be initiated by an employee from the results of employee suggestions, data review, audits, etc. and then reviewed by the Technical Director or the QA Manager. Preventive actions are incorporated in the corrective action template (due to software limitations). When the corrective action template is to be used for a preventive action report, the phrase ‘PREVENTIVE ACTION’ is typed in the “QA Action” field. This distinguishes a preventive action template from a corrective action template. Where appropriate, action plans shall be developed; implemented and monitored that will reduce the likelihood of nonconformance. Action plans shall include the application of controls to ensure that actions taken are effective, and may involve the reanalysis of data, additional auditing, control charts and trends, additional proficiency or QC testing, and issuance of correspondence to clients.

13.1.2.2 The CAR must be prepared at the time the analytical batch has been calculated. Do not wait until all data from the batch is completed. This will lead to unnecessary delay in reprocessing the batch (if necessary) and informing laboratory management, project management, and the client.

13.1.2.3 When completing a CAR, include all accompanying data, information, etc in a "Data Package" along with the NCR and submit this to the Technical Director or Quality Assurance Manager for review. Data packages include the following information.

- Digestion or extraction bench sheets
- ICP and other instrument data such as LACHAT printouts
- All chromatograms within the analytical batch including CCVs
- GC/MS tune criteria
- Analytical "run logs"
- MB, LCS, MS, CCV, post dilution spikes, etc which clearly indicate the results and or percent recoveries (where applicable).
- Any other test specific quality control criteria such as surrogate recoveries and method of additions results

13.1.3 Circumstances for initiating a customer service or project management related CAR.

13.1.3.1 The following types of client complaints or problems will be referred to as Laboratory CARs and should be brought to the Business Unit Manager or the Laboratory Manager. These include but are not limited to:

13.1.3.1.1 Customer Service related complaints

13.1.3.1.2 Comments regarding laboratory services provided

13.1.3.1.3 Any requests after analyses have been completed and files archived

13.1.3.1.4 Client is questioning the results

13.1.3.1.5 Confirmation request

13.1.3.1.6 EDD or Data Package issue

13.1.3.1.7 H flags need to be removed

13.1.3.1.8 Question regarding method used

13.1.3.1.9 Carry over issue

13.1.3.1.10 Questions from regarding an unusual sample or matrix received

- 13.1.3.2 CARs are also required for internal issues. These must also be brought to the Business Unit Manager or the Lab Manager and will be referred to as Internal CARs:
- 13.1.3.2.1 Test code issue
  - 13.1.3.2.2 Problem with LIMS
  - 13.1.3.2.3 EDD Problem
- 13.1.3.3 Certain issues will be handled by the Executive Director of Customer Service. These will be referred to as Customer Service CARs.
- 13.1.3.3.1 Reporting limits are missing
  - 13.1.3.3.2 Analyses times incorrectly entered (especially for short holding time tests)
  - 13.1.3.3.3 Discrepancies and errors found in the QC report
  - 13.1.3.3.4 Analytes reported twice or missing from the report
  - 13.1.3.3.5 Pricing or invoice error
  - 13.1.3.3.6 Login error
  - 13.1.3.3.7 Client wishes to add an analyte or test
  - 13.1.3.3.8 Incorrect bottle order
  - 13.1.3.3.9 Shipping Issues
  - 13.1.3.3.10 Courier issues
  - 13.1.3.3.11 In certain instances, as determined by the Executive Director of Customer Service, a corrective action report will be initiated when jobs with 'Rush' turnaround times or some with routine turnaround times are 48 hours past due.
- 13.1.3.4 Summary of Procedure:
- 13.1.3.4.1 When any of the instances listed in the Scope and Application chapter of this SOP take place, corrective action should be initiated in LIMS (Laboratory Information Management System).
  - 13.1.3.4.2 Each Corrective Action has unique control number automatically assigned by LIMS when form is initiated.
  - 13.1.3.4.3 Project Manager initiates a corrective action. The CAR should include details of the issue, incident or client's request, and forwards report with all supporting documents to either the Business Unit Manager/Laboratory Manager or the Executive Director of Customer Service as outlined above. After decisions on how to handle the corrective action are made, information will be relayed to the client and necessary follow up are performed.
  - 13.1.3.4.4 Corrective action number must be entered into the comments section of the appropriate work order number in LIMS.

- 13.1.3.5 Responsibilities: It is the responsibility of each project manager to ensure the following
- 13.1.3.5.1 Be pro-active and initiate CAR in a timely manner
  - 13.1.3.5.2 Enter CAR number into the comment section of the work order number in LIMS. Initials of the project manager and the date should accompany it.
  - 13.1.3.5.3 Gather all supporting information
  - 13.1.3.5.4 Follow up on all open CARs to make sure all issues are resolved promptly
  - 13.1.3.5.5 Once the Business Unit Manager or the Executive Director of Customer Service review the CAR and make their recommendations, write down these actions under “Corrective Action Required” area. Remember to mark the ‘Notify Clients’ box in the CAR and include the name of the individual who did so. There is also a space for a comment, if needed. If follow-up is required by the QA Manager or the Technical Director as instructed by the Business Unit Manager, enter a statement in the “Corrective Action Required” area that the CAR will be forwarded to the appropriate person, who will then address their portion and close the CAR and notify the Executive Director of Customer Service.
  - 13.1.3.5.6 If no action is required by the QA Manager or Technical Director, the Project Manager will notify either the Business Unit Manager or Executive Director of Customer Service for review depending on what type of CAR it is. The Business Unit Manager or Laboratory Manager will close all Laboratory and Internal CARs while the Executive Director of Customer Service will close all Customer Service CARs.
- 13.1.3.6 It is the responsibility of the Business Unit Manager to ensure the following:
- 13.1.3.6.1 Review CARs and all supporting paperwork on a daily basis
  - 13.1.3.6.2 As appropriate, come up with necessary decision/recommendations and document them in the Corrective Action Required field in LIMS.
  - 13.1.3.6.3 Review “Corrective Action Required” completed by PM
  - 13.1.3.6.4 Make sure CARs promptly closed upon resolution
  - 13.1.3.6.5 Review all CARs on an ongoing basis to assure all CARs have been closed and necessary follow up took place (follow up with QA Manager and Technical Director, if needed)
- 13.1.3.7 Procedure to generate CAR in LIMS, follow the following steps:
- 13.1.3.7.1 From Main Menu go to Quality Assurance
  - 13.1.3.7.2 Select Corrective Action Reports
  - 13.1.3.7.3 Click “Add” and number will be automatically assigned through the LIMS
  - 13.1.3.7.4 Enter PM under Department
  - 13.1.3.7.5 Enter Client ID
  - 13.1.3.7.6 Fill in the “Summary” field by writing short description of the CAR



- 13.1.3.7.7 Fill in the “Initiate By” and “Initiated On” fields
- 13.1.3.7.8 Write a complete and thorough description of the Nonconformance in the “Complete Description of the Non-Conformance” field. The following details must be included for all CARs:
  - 13.1.3.7.8.1 Client’s company name
  - 13.1.3.7.8.2 Work order number and all sample number(s).
  - 13.1.3.7.8.3 Date, time and name of all communications with client representative regarding this issue.
  - 13.1.3.7.8.4 If the problem is internal, make sure to include laboratory department involved and names of laboratory analysts, etc.
  - 13.1.3.7.8.5 If CAR is related to the bottle order or quote, please make sure to include bottle order or quote number
  - 13.1.3.7.8.6 If a credit needs to be issued please make sure to include explanation why, prices used, new prices and documentation supporting new prices, such as quotes, or previous invoice, etc.
- 13.1.3.8 Once CAR number is assigned, this number must be entered in the comment section of LIMS under work order/work orders associated with the CAR! (please note that in some cases, no work order may be associated with the CAR)
- 13.1.3.9 Every CAR must be detailed and contain supporting documentation. This documentation must be present in order for the CAR to be closed. CAR that has missing info or details will be returned to the PMs and will not be closed until all the info is provided. Complete CAR must be forwarded to the Executive Director of Customer Service or Laboratory Manager in case of the Executive Director of Customer Service’s absence. These are some of the examples for the supporting documentation required:
  - 13.1.3.9.1 In case of CAR about additional analytes requested after final report has been mailed to the client, please do the following:
    - 13.1.3.9.1.1 Describe client’s request in the CAR and e-mail the Executive Director of Customer Service (when possible, forward the client’s email).
    - 13.1.3.9.1.2 the Executive Director of Customer Service will review the CAR and determine if EETSE Atlanta can fulfill the request
    - 13.1.3.9.1.3 If EETSE Atlanta can fulfill the request, the Executive Director of Customer Service will e-mail to PM to make necessary changes in the log in
    - 13.1.3.9.1.4 Executive Director of Customer Service will then email the appropriate lab manager referencing the CAR number, and the requested changes to be made.
    - 13.1.3.9.1.5 After changes are made, necessary corrections will be made to the report.
    - 13.1.3.9.1.6 Once corrections are made, the Executive Director of Customer Service will inform PM to proceed with report revision. Make sure to issue revision note on the cover letter. We are required by NELAC and other certifying / accrediting agencies to document any changes that were made after final copy of the report is mailed to the client.



- 13.1.3.9.1.7 If revision reflects in a price change, M invoice must be generated or old invoice amended, depending on the arrangements made with a client. It is PM's responsibility to list any additional charges when submitting CAR and provide a decision if new M invoice or changes to an old invoice are required.
- 13.1.3.10 In case of CAR about incorrect prices or invoice please make sure to provide the:
- 13.1.3.10.1 Old invoice
  - 13.1.3.10.2 COCR
  - 13.1.3.10.3 Copy of COC
  - 13.1.3.10.4 Price quote (if any)
  - 13.1.3.10.5 If invoice is being changed in the LIMS system please make sure to save as a revised invoice on portal. The revised invoice, and COCR are then email to Accounts Receivable, referencing the CAR number. Accounts receivable will then update Peachtree, COCR, and add comments to CAR indicating this.
  - 13.1.3.11 For a CAR about bottle order or shipping, provide a copy of the bottle order tracking number and any other documentation that will support the CAR, such as client's fax, etc.
  - 13.1.3.12 The Executive Director of Customer Service will address issues that involve pricing, inclusion of an additional analyte from the existing method, addition of another test to the work order, or a request for another report format (i.e. MDL Report). All other issues should initially be brought to the Business Unit Manager or Laboratory Manager for review. When the Business Unit Manager/Laboratory Manager has assessed the corrective action report, he will either give it back to the Project Manager with the action to resolve the issue or forward it to another person to continue the investigation. Typically, these CARs will go to the Department Directors, the Technical Director, or the QA Manager.
- When CAR is completed by the laboratory personnel, the CAR file will be returned to the PM for client resolution (i.e. price changes, report reissued, etc.). The Executive Director of Customer Service must be notified about the completion of all PM CARs. All PM CARs that have not been closed by the QA Manager or Technical Director are closed by the Executive Director of Customer Service.
- 13.1.4 Instances when an expedited Corrective Action Report is Required
- 13.1.4.1 Missed hold times (in which the sample was received within hold)
  - 13.1.4.2 Broken or spilled samples limiting analysis
  - 13.1.4.3 Client submits what appears to be blind QC samples or spiked duplicates
  - 13.1.4.4 Any time a sample exhibits peculiar behavior such as strong chemical odor, makes eyes water, sample steaming when lid removed, sample smoking, effervescing, or pressure release when opened (like a soda) etc.
  - 13.1.4.5 A known hazardous sample received (PCB oil, jar of mercury, Hydrofluoric Acid, etc.)
  - 13.1.4.6 When meeting the client/sample requirements involve OT or unscheduled weekend work
  - 13.1.4.7 When incorrect sample preservation is noted
  - 13.1.4.8 When litigation or public investigation (a news story) associated with sample is involved.
  - 13.1.4.9 When a CAR has been initiated for reanalysis in order to reissue a new result.
- 13.1.5 Per AIHA LAP LQSR section 4.8, complaints about the quality of reported results may be referred to the accrediting body if such complaints cannot be resolved directly with the customer.

- 13.2 General Procedures and Responsibilities for Corrective Action Reports Involving Deficiencies.
- 13.2.1 When the QA Dept. or Technical Director issues a corrective action report (CAR) for a non-conformance classed as a deficiency, the Laboratory Manager, Executive Director of Customer Service or Technical Director will be informed immediately.
- 13.2.2 The QA Manager will track the completion of the corrective actions required to correct the deficiency. The assigned personnel are responsible for completing the corrective action within the specified time frame.
- 13.2.3 The chain of custody and the Sample Receipt Forms are used to document non-conformance during log-in.
- 13.3 Method Suspension or Restriction
- 13.3.1 In some cases, it may be necessary to suspend or restrict the use of a method that constitutes significant risk and or liability to EETSE Atlanta. Suspension or restriction procedures can be initiated by the Quality Assurance Manager, Technical Director, Laboratory Manager, or Business Unit Manager.
- 13.3.1.1 Prior to suspension or restriction, confidentiality is respected, the problem and the required corrective action is stated in writing on the associated CAR and presented to the Laboratory Manager.
- 13.3.1.2 The Laboratory Manager, Technical Director, Quality Assurance Manager, and the affected supervisor are notified.
- 13.3.1.3 The Laboratory Manager arranges for the operations people to speak with the Quality Assurance Manager or Technical Director the day of notification. This meeting is held to confirm that there is a problem and that suspension/restriction of the method is required.
- 13.3.2 The suspension or restriction meeting will conclude with a discussion of the steps necessary to bring the method or test fully back on line if the method is suspended or restricted. The Quality Assurance Manager will also specify any documentation necessary to verify that corrective action has occurred.
- 13.3.3 After suspension or restriction, the laboratory will hold all reports to clients pending review. No faxing, mailing or distributing through electronic means may occur. It is the responsibility of the Laboratory Manager to hold all reports. Clients will not generally be notified at this time. Analysis may proceed in some instances depending on the non-conformance issue.
- 13.3.4 Upon completion of the required corrective actions per the CAR, laboratory management will determine if the affected systems are back in control. Once documentation and data associated with the CAR have been reviewed and approved by upper management, the Business Unit Manager, Laboratory Manager, Quality Assurance Manager, or Technical Director will notify laboratory personnel to resume testing. At that time, reports can be released. If systems are still deemed out of control, further corrective actions are required. A team, with all principals involved can devise a startup plan to cover all steps from client notification through compliance of method and release of reports.
- 13.3.5 If the QA Dept. or Technical Director recommends client notification regarding effects on past or current data quality, all associated information is forwarded to the Laboratory Manager and Business Unit Manager. They will review the data and determine appropriate actions.

13.3.6 Client notifications are the responsibility of the Laboratory Manager and Business Unit Manager.

13.4 Procedure for the issuing, completing, and closing of a PM or Customer Service related CAR.

13.4.1 CAR should be opened for the following reasons:

- a) Any client complaints regarding prices, customer and laboratory service provided, courier service, bottle orders, shipping, invoices, analyses, additional requests after reports have been issued and files archived, etc.
- b) Any situation that might have occurred within the laboratory such as results not reported on time, missing information (i.e. reporting limits, analysis dates and times, missing samples, missing analytes, etc.).

13.4.2 CAR must be generated through LIMS as follows:

- a) From Main Menu go to “Quality Assurance”
- b) Select Corrective Action Reports
- c) Click “Add” and number will be automatically assigned through the LIMS
- d) Enter PM under Department
- e) Enter Client ID
- f) Fill in the “Summary” field by writing short description of the CAR
- g) Fill in the “Initiate By” and “Initiated On” fields
- h) Write a complete and thorough description of the Nonconformance in the “Complete Description of the Non-Conformance” field. For all CARs details must include: client’s name, work order number, date, time and name of the person spoken to. If the problem is internal, make sure to include laboratory department involved and names of the laboratory analysts, etc. If CAR is related to the bottle order or quote, please make sure to include bottle order or quote number. If a credit needs to be issued please make sure to include explanation why, prices used, new prices and documentation supporting new prices, such as quotes, previous invoice, etc.

13.4.3 Once the CAR number is assigned, this number must be entered in the comment section of LIMS under Work order / Work orders associated with the CAR.

13.4.4 Every CAR must contain supporting documentation. This documentation must be present for the CAR to be closed. CARs that are missing information or details will be returned to the PM. Complete CARs must be forwarded to the Director of Project Management or Laboratory Manager if Director of Project Management is absent.

13.4.4.1 Examples of supporting documentation are as follows:

13.4.4.1.1 In case of NCR about incorrect prices or invoice please make sure to provide following info: old invoice; Chain of Custody Record (COCR), copy of COC, price quote. If invoice is being changed in the LIMS system please make sure to issue revision note on the cover letter. We are required by TNI and AIHA LAP to document any changes that were made after final copy of the report is mailed to the client. This cover letter is for in-house purposes only unless requested by client. All revised documents must be given to receptionist for rescanning.

13.4.4.1.2 In case of NCR about bottle order or shipping please provide a copy of the bottle order, tracking number and any other documentation that will support the NCR, such as client’s fax, etc.

13.4.5 After all the facts and documents are gathered, they must be turned in to Director of Project

Management or the Laboratory Manager. They will review all the information and come up with the decision that will be recorded under “Description of the Corrective Action”. QA Manager is notified, if QA Action is required. All Project Manager or Customer Service CARs must be closed by the Director of Project Management or his designee within 3 business days.

### 13.5 Exceptionally Permitted Departures from Documented Policies and Procedures

13.5.1 Due to the frequently unique nature of environmental samples, it may be necessary to depart from documented policies and procedures when dealing with the sample(s). When the analyst encounters this type of situation, he presents the problem to his supervisor for advice. The supervisor may elect to discuss it with the Technical Director or have a technical representative contact the client to decide on a logical course of action. Once an approach is agreed upon, the analyst notes it in the raw data folder. This information can then be supplied to the client in the form of a footnote or a case narrative with the report.

### 13.6 Addressing Complaints

13.6.1 Addressing complaints is a normal function of conducting business and a valuable tool to improve services to and relationships with clients. The goal of EETSE Atlanta is to provide expeditious resolution of complaints. At EETSE Atlanta, the supervisor and the management team handle complaints related to sample results. Client Services resolves specific complaints concerning container orders, shipping, expected report dates, and results. This information is documented in LIMS. The procedure used for addressing complaints follows the Corrective Action Report.

13.6.2 In the event that a complaint is related to the laboratory’s compliance with its own policies and procedures, the rules of an accrediting agency, or the validity of data, the Quality Assurance Manager and or Technical Director initiate an internal audit of the areas involved. These personnel document the complaint, audit findings and recommendations.

### 13.7 Immediate and Long Term Corrective Action

Immediate corrective actions are necessary to correct or repair non-conforming equipment and systems. This type of corrective action is usually identified by the section supervisor through the use of calibration checks and QC sample analysis

13.7.1 Long term corrective actions are necessary to eliminate causes of non-conformance. The need for such actions may be identified by audits. Examples of this type of action include:

13.7.1.1 Staff training in technical skills or in implementing the quality assurance program.

13.7.1.2 Rescheduling of laboratory routines to ensure analyses are performed within holding times.

13.7.1.3 Identifying vendors to supply reagents of sufficient purity.

13.7.1.4 Revision of quality assurance system or replacement of personnel.

13.7.2 Various auditing authorities may also initiate a corrective action, when deemed necessary.

13.7.3 For either immediate or long term corrective actions, the steps comprising a closed loop corrective action system are as follows:

13.7.3.1 Define the problem.

13.7.3.2 Assign responsibility for investigating the problem.

13.7.3.3 Investigate and determine the cause of the problem.

13.7.3.4 Determine a corrective action plan to eliminate the problem.

13.7.3.5 Assign and accept responsibility for implementing the corrective action.

13.7.3.6 Establish effectiveness of the corrective action and implement the correction.

13.7.3.7 Verify that the corrective action has eliminated the problem.

13.7.3.8 Update risks and opportunities determined, if applicable

13.7.3.9 Make changes to the management system, if necessary

## 13.8 Responsibility for Document Control

The QA department is responsible for document control for the laboratory. Critical documents include the QA Manual, the SOPs, the Corrective Action forms and reports, internally used forms and information, the training files, the MDL studies, the retention time studies, safety training files, performance evaluation reports, certification correspondence and manuals, audit reports and responses, and traceability certificates.

## 14.0 PERFORMANCE AND SYSTEM AUDITS

### 14.1 Purpose

The purpose of conducting audits is to monitor and verify compliance and overall effectiveness of the QA Program. Communication of audit findings to management is required for timely consideration and implementation of corrective actions.

### 14.2 External Audits

- 14.2.1 External audits are performed when certifying agencies or clients conduct on-site inspections. It is EETSE Atlanta's policy to cooperate fully with certifying agencies. It is also EETSE Atlanta's policy to comply fully with system audits conducted by regulatory agencies and clients.
- 14.2.2 The laboratory is involved in external performance audits conducted semi-annually through the analysis of Performance Testing (PT) samples provided by a third party. EPA performance testing studies have been referred to as Water Pollution Study (WP) and Water Supply Study (WS). Additional PTs including soil studies are analyzed per the requirements of TNI and AIHA LAP.
- 14.2.3 During on-site audits, auditors may come into possession of information claimed as business confidential. A business confidentiality claim is defined as "a claim or allegation that business information is entitled to confidential treatment for reasons of business confidentiality or a request for a determination that such information is entitled to such treatment".

When information is claimed as business confidential, the laboratory must place on, or attach to, the information at the time it is submitted to the auditor, a cover sheet, stamped or typed legend, or other suitable form of notice, employing language such as "trade secret", "proprietary" or "company confidential". Confidential portions of documents must always be clearly identified. Confidential business considerations may be purged of references to client identity by the responsible laboratory official at the time of removal from the laboratory. Sample identifiers may not be obscured from the information.

### 14.3 System Audits

- 14.3.1 It is the responsibility of the QA Manager to plan and organize audits as required by a predetermined schedule and as requested by management. Such audits are carried out by trained and qualified personnel who are, whenever resources permit, independent of the activity to be audited.

Laboratory audits are split into smaller audits that are performed within the calendar year at the specified frequency. Audits are performed monthly, quarterly and annually by the Quality Assurance Manager, the Quality Assurance Officer, Department Managers, or an appointed representative. These audits are performed using the laboratory monthly, quarterly, and annual checklists along various regulatory program checklists.



These audits provide information on whether the management system:

- conforms to the laboratory's own requirements for its management system (including the laboratory activities)
- conforms to the requirements of ISO/IEC 17025:2017 and Assessment Checklists
- is effectively implemented and maintained

Additional audits may be necessary throughout the year to address specific project requirements or issues that arise from other audits. Findings of all audits and their associated corrective actions are presented in management reports and posted to the portal server.

14.3.2 Routine report audits are the responsibility of the laboratory Quality Assurance Manager. The Quality Assurance Manager performs an independent systems review of reports generated by the laboratory.

14.3.2.1 The reviewer is not expected to pursue the correctness of every reference in the file contents, but instead concentrates on the internal consistency of the data package.

14.3.2.2 Areas that are reviewed include the chain-of-custody, correspondence with the analytical request, batch QC status, completeness of any corrective action statements, calculations, format, holding time, sensibility and completeness of the project, and file contents. A list of reports reviewed is maintained in an audit file.

14.3.3 Internal audits are planned and conducted in accordance with a schedule developed by the QA Manager. Unscheduled audits or surveillance are also conducted when senior management deems it necessary. QA Department checklists, which are located on the portal server, are used during these in-house assessments.

14.3.4 The responsible management personnel are required to make all personnel, records, reports and documents available to the audit team.

14.3.5 Responsible management of the areas audited is required to provide prompt corrective action in accordance with the provisions of this manual.

14.3.6 Follow-up audits or surveillance is performed, as required, to verify the implementation of corrective action.

14.3.7 When the required corrective action is not implemented within the specified time period, the QA Manager notifies the Business Unit Manager. A Corrective Action Notice form is used for this purpose. The Business Unit Manager performs any required corrective actions.

14.3.8 Audit planning and findings are recorded and filed as part of the QA records.

14.3.9 At the discretion of the Business Unit Manager, impacted clients are notified in writing if the audit result findings indicate any reported data has been compromised.

#### 14.4 Blind Sample Audits

14.4.1 Blind sample audits are performed through the submittal of QC samples to the analyst along with the sample true values, which are only made known to the analyst after the test is complete. Blind sample audits are carried out by the Quality Assurance Manager, Technical Director, clients and certifying agencies as necessary to assure the laboratory is capable of achieving success with a blind QC sample. For continuing TNI and AIHA LAP accreditation, the laboratory must, on a continuous basis, successfully complete two of the last three consecutive proficiency rounds for a given PT field of testing.



- 14.4.2 In addition to the PT samples submitted to the laboratory through third party vendors, the laboratory may also participate in a company-wide internal PT program to evaluate methods that are not commonly included in the semi-annual PT studies. These studies usually occur between January and February and more frequently if deemed necessary.
- 14.4.3 It is recognized that PT samples are often not representative of "real world" samples either in their form (e.g., vials), content (e.g., multiple target analyte hits), or documentation (e.g., no chain of custody) and, as such, present the laboratory with special challenges.
- 14.4.4 It is the policy of EETSE Atlanta that PT samples are treated as typical samples in the normal production process wherever possible. Further, if PT samples present special or unique problems in the normal production process, then they should be treated differently, as would any special or unique request submitted by any client. Holding time begins when the vial is opened. Full volume PT samples follow normal holding time procedures and storage requirements.
- 14.4.5 Login obtains the normal COC information from the documentation provided with the PT samples with review by QA or other designated staff.
- 14.4.6 Vials are prepared as required in the instruction set provided with the samples. After preparation to full volume, the samples may be spiked, digested, and or concentrated as necessary in a manner similar to normal samples received at the laboratory.
- 14.4.7 The following procedures may be required for the analysis/reporting of PT samples.
  - 14.7.7.1 PT samples will not undergo multiple preparations, multiple runs, multiple methods (unless they are being used to evaluate multiple methods), or multiple dilutions, unless these are the procedures that are normally applied to typical client samples or if a corrective action is in progress for the instrument, batch QC, etc.
  - 14.7.7.2 PT sample(s) will not be subjected to special reviews by operational staff or QA unless this would be normal laboratory practice. To the degree that special report forms or login procedures are required by the PT supplier, it is reasonable that the laboratory would apply special review procedures as would be performed for any client requesting unusual reporting or login processes.
- 14.4.8 Special QC samples can be included in any analytical run.

### 14.5 Quality Systems and LIMS Management Review

At least annually, the Business Unit Manager conducts a formal management review to evaluate the effectiveness of the laboratory's quality systems, management system, and LIMS to ensure their continuing suitability and effectiveness in meeting client and regulatory requirements and to introduce any necessary changes or improvements. During this process, the laboratory identifies opportunities for improvement and implements the necessary actions. Inputs to the management review and opportunities for improvement can be identified by suitability procedural and policy review, fulfilment of objectives, internal and external issues, actions from previous management reviews, internal and external audit findings, corrective actions, recurring issues, suggestions from personnel, feedback from Client Satisfaction Survey, complaints, changes in volume/type of work, adequacy of resources, effectiveness of improvements, training, risk assessment, and Proficiency Test results among others. Following the review, the Quality Assurance Manual or SOPs may be revised to reflect any significant changes made to the quality systems.

- 14.5.1 The quality systems and LIMS management review uses information generated during the preceding year to assess the total laboratory and ensures that routine quality actions taken and reviewed on a quarterly basis are not components of larger systematic concerns. The quarterly review (see section 15) is designed to keep the quality systems current and effective.
- 14.5.2 Significant issues from the following documentation are summarized by the Quality Assurance Manager prior to the review meeting:
- 14.5.3.1 Matters arising from the previous annual review.
  - 14.5.3.2 Prior Quarterly Quality Assurance Reports.
  - 14.5.3.3 Review of report reissue requests.
  - 14.5.3.4 Minutes from prior management and staff meetings
  - 14.5.3.5 Minutes from prior senior management meetings that discuss adequacy of staff, equipment and facility resources.
  - 14.5.3.6 Prior customer service or business development meeting information.
  - 14.5.3.7 Internal and external audits, including computer audits performed during the past year.
- 14.5.4 The annual review can occur anytime during the year. Based upon the annual review, a report is generated by the Quality Assurance Manager. This report includes the following information.
- 14.5.4.1 The date of the review and the names and titles of participants.
  - 14.5.4.2 References to the existing documents and topics that were covered in the review process.
  - 14.5.4.3 Quality system or LIMS changes/improvements that will be made as a result of the review.
  - 14.5.4.4 Decisions and actions shall be documented.
  - 14.5.4.5 The effectiveness of the management system and its processes will be included.
  - 14.5.4.6 Provision for required resources.
  - 14.5.4.7 Needs for change and a schedule including assigned responsibilities for the changes.
- 14.5.5 Following any review, the Quality Assurance Manual or SOPs may be revised to reflect any significant changes made to the quality systems.

#### 14.6 Corrective Action

- 14.6.1 All deficiencies found during audits are reported to the Laboratory Manager, Quality Assurance Manager, and the Technical Director (see Section 15, "Quality Assurance Reports to Management"). The Laboratory Manager, Technical Director, and Quality Assurance Manager agree upon a time frame for correction. The laboratory's response and corrective action procedures are evaluated by the Quality Assurance Manager and when acceptable, are attached to each audit and filed. If issues arise that may require method suspension or restriction, the procedures outlined in Section 13, "Corrective Action," are followed.
- 14.6.2 External audits often require written reports that include proof of correction. The Quality Assurance Manager coordinates the written response to the external auditing facility.
- 14.6.3 Written responses to PT results are required. The response must address the reason for any unacceptable or "Check for Error" result. In some cases it may be necessary for blind QC samples to be submitted to the laboratory to show a return to control.

- 14.6.4 Whenever a laboratory fails a study, it shall determine the root cause for the failure and take any necessary corrective action. If a laboratory fails two out of the three most recent studies for a given PT field of testing, its performance is considered unacceptable under the TNI and AIHA LAP standards for that field. The laboratory shall then need to meet the requirements of initial accreditation. For initial studies, the PT samples shall be analyzed at least 15 days apart. The laboratory must successfully complete two PT studies out of the most recent three rounds attempted for each requested PT field of testing.

## 15.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

### 15.1 Internal Reports

The Quality Assurance Manager submits quarterly reports regarding the status of QA/QC activities to the Business Unit Manager. Section 15.3 lists the minimum content of this report. The Quality Assurance Manager also submits an annual report to the Business Unit Manager.

### 15.2 External Reports

Certain projects under regulatory review require establishment of explicit quality assurance objectives and quarterly summaries of QA conformance and corrective action. The laboratory technical and quality assurance staffs provide the necessary information required to establish quality assurance objectives for particular projects. Once the QA deliverables options are selected for the project, sufficient quality control data will be provided in the individual analytical report to allow a periodic assessment of the overall progress of the project. Upon request, any information or reports needed are provided by laboratory management with review by the QA Manager.

### 15.3 Quarterly and Annual Reports

The quarterly or annual reports to management include the following information.

- 15.3.1 SOP. The report indicates any changes to existing SOPs or any new SOPs.
- 15.3.2 Corrective action reports. The report contains information about any corrective action reports that may have been written during the time period since the last QA report.
- 15.3.3 MDL. Any changes in MDL should be included in the QA report.
- 15.3.4 Audits. The QA report includes the results of any audits performed during the time period since the last report.
- 15.3.5 PE samples. The report includes the results of PE samples analyzed since the last report. The PE report indicates the status of performance as it relates to current laboratory accreditations.
- 15.3.6 Certifications. Changes or additions to the laboratory's certifications are addressed in the reports.
- 15.3.7 The annual report is reviewed and signed by the Business Unit Manager, Laboratory Manager, and the Technical Director. A copy of this report is kept for 5 years.

## 16.0 REAGENT STORAGE AND DOCUMENTATION

### 16.1 Safety and Shelf Life

Reagents are stored with consideration for safety and maximum shelf life. Storage conditions and documentation maintenance status for various classes of reagents are given in Table 16-1 and Table 16-2, and are discussed below.

- 16.1.1 All acids, except those poured into small marked containers for immediate use and those that are standardized for specific purposes, are stored in the original containers in acid storage cabinets.

- 16.1.2 All bases, except those poured into small containers for immediate use and those that are standardized for specific purposes, are stored in the original containers within designated areas or storage cabinets.
- 16.1.3 All flammable solvents, except those poured for immediate use, are stored in original containers in approved, vented, flammable storage cabinets, which are located indoors.
- 16.1.4 Dry reagents are stored in designated cabinets in cool, dry areas. Reactive chemicals, cyanides and sulfides are labeled and isolated from other chemicals.
- 16.1.5 All acids used for metal sample digestions and all solvents used for semi-volatile sample extraction may be tested prior to initial use. Lot numbers used for digestions or extractions are recorded in bound notebooks in the appropriate departments.
- 16.1.6 Reagent blanks are analyzed with each sample batch for all methods, validating the purity of all reagents. All reagent containers are dated when received, and dated and initialed when opened (except high use items consumed in less than one week). Documentation is maintained to provide traceability of the reagents used with the analysis of any batch to specific reagent lot numbers.

**TABLE 16-1**  
**STORAGE OF REAGENTS AND CHEMICALS**

| <u>CHEMICAL REQUIREMENTS</u>                   | <u>STORAGE</u> |
|------------------------------------------------|----------------|
| Concentrated acids and bases                   | 1              |
| Standards for metals analysis                  | 2              |
| Standards for extractable organics             | 3              |
| Standards for volatile organics                | 4              |
| Bulk dry chemicals                             | 5              |
| Working solutions containing organic compounds | 6              |
| Working solutions containing only inorganics   | 7              |
| Flammable solvents                             | 8              |
| Non-flammable solvents                         | 9              |

**Table 16-2**  
**STORAGE REQUIREMENT KEY**

1. Stored in the original containers in acid/base cabinets. All organics must be stored separately.
2. Stored at room temperature in the standards cabinet of the metals department.
3. Stored below 0° C in the department.
4. Neat standards are stored at room temperature in the standard cabinet in the department. Stock solutions and working solutions are stored in the freezer.
5. Bulk reagents are stored at room temperature in reagent storage cabinets located throughout the laboratory.
6. Stored refrigerated at 1-4° C in the department.
7. Stored at room temperature in the department; refrigeration is optional.
8. Stored in solvent cabinets in the organic extraction laboratory.
9. Stored separately from the flammable solvents in cabinets in the organic extraction laboratory.

## 17.0 WASTE DISPOSAL

- 17.1 EETSE Atlanta operates as a conditionally exempt, small quantity generator.
- 17.2 All waste disposal is carried out in accordance with EETSE Atlanta Waste Disposal SOP, HS-03005. These documents include procedures for identification, storage, personnel training, tracking forms, report forms and safety, as well as details of the disposal. Hazardous waste disposal procedures are discussed below.
- 17.3 Hazardous Waste Requirements:
  - 17.3.1 Hazardous waste is stored in non-leaking containers that are in good condition with close-fitting lids. The lids are kept closed when wastes are not being added or removed.
  - 17.3.2 Hazardous waste storage containers are labeled with waterproof labels. The labels specify the words "Hazardous Waste", composition and physical state of the waste, hazardous properties of the waste (e.g., flammable, reactive, etc.), and the name and address of the generator.
  - 17.3.3 Each hazardous waste container is clearly labeled with the date the period of accumulation began. The date is also documented on the Hazardous Waste Tracking Log Form (see Section 17.5.8).
  - 17.3.4 All containers are handled in a way that minimizes the possibility of spills and escape of wastes into the environment.
  - 17.3.5 Wastes are stored in an area that is regularly inspected for deteriorating or leaking containers.
  - 17.3.6 All wastes are segregated during temporary accumulation, storage, and for disposal. Prior to disposal, waste materials are carefully combined into categories or waste streams based upon their compatibility.
  - 17.3.7 The following three types of waste are stored in 55-gallon drums.
    - 17.3.7.1 Halogenated solvents such as methylene chloride (closed cap metal drum)
    - 17.3.7.2 Non-halogenated flammable solvents (closed cap metal drum).
    - 17.3.7.3 Heavy metals or other aqueous wastes except cyanide (poly drum)
  - 17.3.8 All other wastes are stored in the original container or 4-liter glass bottles and disposed of via a "lab pack" (i.e., packed by a disposal company in 55-gallon open top drums).
- 17.4 Sample Disposal (See also EETSE Atlanta SOP HS-03005)
  - 17.4.1 After completion of the analysis, unused sample portions, extracts, or digests are transferred to a central secured storage area until they are disposed. Unless a client requests that the project manager save unused samples, digests, or extracts, disposal from the central storage occurs 30 days after submission for test results.
    - 17.4.1.1 Summary of sample disposal procedure:
      - 17.4.1.1.1 Samples are initially put into labeled bins in the walk-in cooler for 30 days in case client decides to add test(s) that require refrigerated storage. All bins must be labeled. Labels include storage location and date of disposal.
      - 17.4.1.1.2 Sample reporting date is used to initiate the 30 day time period. Samples that were put on hold upon receipt should use the date associated with the earliest reported test result unless otherwise indicated by the client or noted by the project manager.
      - 17.4.1.1.3 When attaching labels to the bin, use both the adhesive on the label as well as a piece of clear tape to ensure the label does not come off.



- 17.4.1.1.4 Sample Management Supervisor (a.k.a. Bottle Prep Supervisor) maintains a list of bin disposal dates. Supervisor must sign and date this sheet in order for bins to be disposed. No bins are to be disposed of by disposal technician without management approval.
  - 17.4.2 Requests for extended sample, digest or extract storage must be provided by the client to the EETSE Atlanta project manager in writing (contract form) prior to sample receipt. Extended storage may result in the charging of additional fees by the EETSE Atlanta project manager prior to sample receipt. EETSE Atlanta is not responsible for evaporation or other deterioration of samples, extracts, or digests during extended storage periods.
  - 17.4.3 Clients that want the return of samples may pick them up at the laboratory, request shipment by FedEx (at the client's expense for packaged shipping), or utilize any other legal means that they choose. Clients requesting the return of samples should provide detailed shipping instructions.
  - 17.4.4 If a client, by contract, specifies sample disposal by a hazardous waste contractor, the client's name and EPA ID number will be used on the manifest and the client will be invoiced for all disposal-related costs.
  - 17.4.5 Other excess sample portions are composited by the laboratory according to matrix (solids, soils or aqueous). Composited soils, sediments & other solid samples are sub-sampled and analyzed for hazardous waste characteristics (ignitability, reactivity, (releasable cyanide and sulfide), corrosivity (pH), toxicity (TCLP by SW-846 Method 1311) and PCBs). If the pooled sub-sample is characterized as hazardous by any of the hazardous waste characteristics or contains greater than 50 ppm PCBs, the excess sample is disposed of through the use of a hazardous waste contractor. If the pooled sub-sample is not deemed hazardous based upon the results of these tests, the composited excess material is disposed of in an industrial/municipal landfill.
  - 17.4.6 Aqueous samples are neutralized and disposed of via the municipal sewer system, following all discharge requirements outlined in 40 CFR Part 261.3 (a)(2)(iv)(E).
- 17.5 Organic Waste Disposal (See also EETSE Atlanta SOP HS-03005)
  - 17.5.1 Similar waste disposal procedures for samples from the volatile, semi-volatile and GC/HPLC pesticide laboratories are employed at EETSE Atlanta.
  - 17.5.2 All personnel should be familiar with the SOP prior to the disposal of wastes in the laboratory.
  - 17.5.3 EETSE Atlanta is considered as a Conditionally Exempt, Small Quantity Generator under 40 CFR Part 261.5 (a generator who generates no more than 100 kilograms of hazardous waste or 1 kilogram of acute hazardous waste in a calendar month and accumulates no greater than 1000 kilograms of hazardous waste). Hazardous waste storage is limited to quantity and/or accumulation and must comply with RCRA regulations as specified in 40 CFR. These wastes are packaged and separated according to compatible groups (e.g., solvents, acids, etc.)
  - 17.5.4 The pH of the discharged waste MUST be between 5 and 10. If the pH of the discharged waste is out of this range, it is diluted with water or treated with the appropriate acid or base.
  - 17.5.5 Apparatus and Equipment
    - 17.5.5.1 Respirator and gloves
    - 17.5.5.2 5-gallon plastic buckets with lids



## 17.5.6 Reagents and Chemicals.

### 17.5.6.1 Marble chips for neutralizing acid waste

## 17.5.7 Procedure

Prior to the disposal of any waste, the Health and Safety Officer provides a sample disposal list to the laboratory employee performing the task. Included in this list is the method of disposal and location of disposal for each sample. The Health and Safety Officer obtains this information from the EETSE Atlanta LIMS system and categorizes the samples as hazardous or non-hazardous.

### 17.5.7.1 The procedure for the collection and disposal of expired organic chemicals and solutions is outlined in the subsequent sections.

#### 17.5.7.1.1 Neat standards are sealed and labeled.

#### 17.5.7.1.2 Expired standards and reagents should be separated from others and stored in a box labeled "Expired". All stock standards, working standards and unused sample extracts are emptied into a properly labeled (contents are listed using the official waste storage labels) 4-L empty solvent bottle or flammable canister as applicable.

#### 17.5.7.1.3 Waste standards or samples containing Silvex (2,4,5-TP), 2,4,5-T, or PCBs are stored separately from other waste standards. These compounds are potential dioxin wastes. All acid herbicide standards or sample waste are stored separately from other wastes.

#### 17.5.7.1.4 HPLC/GC vials containing solvents, standards and extracts are stored in a labeled, 4-liter, empty solvent bottle.

#### 17.5.7.1.5 Wastes are never allowed to accumulate in the laboratory for longer than 3 days. Wastes that are stored for longer time periods are stored in the waste storage room located at the back of the laboratory. All dated waste is disposed of in drums.

#### 17.5.7.1.6 Each drum is labeled according to contents, i.e., chlorinated, non-chlorinated solvents, acid and mercury waste. Acid wastes are stored in the acid waste room that is separate from the solvent waste room.

#### 17.5.7.1.7 All wastes are treated inside the fume hood using appropriate safety equipment such as a respirator, gloves, laboratory coat, and safety glasses.

#### 17.5.7.1.8 The Safety Officer is notified in the event of any leaks or spills of hazardous wastes.

#### 17.5.7.1.9 The waste drums available are:

- Flammable Waste
- Soil Waste
- Acid Waste
- Methylene Chloride Waste
- Neutralized Waste

#### 17.5.7.1.10 Autosampler vials full of sample waste are placed into an empty 4-liter solvent bottle, properly labeled, dated, and stored in waste room, where they are lab-packed.

#### 17.5.7.1.11 High-level organic wastes are treated as hazardous substances and are placed in clearly labeled containers. Full containers are stored in the inorganic waste storage room.

#### 17.5.7.1.12 Containers that have been used for the storage of high level wastes are not reused.

17.5.7.1.13 Soil samples are transferred to 55-gallon drums. When full, a composite sample is analyzed for TCLP and characterized for disposal through the use of a Hazardous Waste Contractor.

17.5.7.1.14 Contents of used VOC vials are neutralized prior to disposal into the sanitary sewer.

17.5.7.2 The neutralization of alkaline or acidic wastes is performed with the following procedure.

17.5.7.2.1 A 5-gallon bucket with a strainer bottom is placed directly into a sink.

17.5.7.2.2 The bucket is filled with 6 to 8 inches of marble chips.

17.5.7.2.3 Pass a generous flow of water through the bucket containing the marble chips.

17.5.7.2.4 The samples are added to the bucket at the same time that the water is flowing allowing the samples to drain through the chips and become neutralized.

17.5.8 The Waste Disposal Logbook is located in close proximity to each drum. The following information is added to the logbook:

EETSE Atlanta WORK ORDER Number

Client Sample I.D. Number

Employee(s) Name(s)

Nature of Disposal

17.5.9 The Health and Safety Officer maintains a separate waste disposal record file. These files contain the master list of samples that have been disposed, TCLP analytical results, raw data, and disposal manifest receipts.

17.6 Inorganic Waste Disposal (See also EETSE Atlanta SOP HS-03005)

The procedure for the collection and disposal of expired inorganic chemicals and solutions is outlined in the subsequent sections.

17.6.1 EETSE Atlanta is considered as a Conditionally Exempt, Small Quantity Generator under 40 CFR Part 261.5 (a generator who generates no more than 100 kilograms of hazardous waste or 1 kilogram of acute hazardous waste in a calendar month and accumulates no greater than 1000 kilograms of hazardous waste). Hazardous waste storage is limited to quantity and/or accumulation and must comply with RCRA regulations as specified in 40 CFR. These wastes should be packaged and separated according to compatible groups (e.g., solvents, acids, etc.). Waste water containing toxic waste from the laboratory that does not exceed 1% of total waste water flow can be disposed of into the sanitary sewer system as specified in 40 CFR part 261.3E.

17.6.2 The pH of the discharged waste MUST be between 5 and 10. If the pH of the discharged waste is out of this range, it is diluted with water or treated with the appropriate acid or base.

17.6.3 Apparatus and Equipment

17.6.3.1 Large polyethylene tank (250 gallon)

17.6.3.2 Latex gloves

17.6.3.3 Stirring rod (glass or wood)

17.6.4 Reagents and Chemicals

17.6.4.1 Soda Ash, sodium carbonate ( $\text{NaCO}_3$ )

## 17.6.5 Procedure

Prior to the disposal of any waste, the Health & Safety Officer provides a sample disposal list to the laboratory employee performing the task. Included in this list is the method of disposal and location of disposal for each sample. The Health and Safety Officer obtains this information from the EETSE Atlanta LIMS system and categorizes the samples as hazardous or non-hazardous.

17.6.5.1 All inorganic aqueous waste is poured into a 250 gallon tank in the disposal room by disposal personnel. When the tank is approximately half full, the solution can be neutralized.

17.6.5.2 Soda Ash is slowly added to the waste solution while it is stirred. The solution will effervesce as the Soda Ash neutralizes the acid in the solution.

17.6.5.3 When the pH of the liquid has been sufficiently neutralized, the waste is drained slowly. The tank is flushed with copious amounts of water.

17.6.5.4 Samples with observed concentrations of measured analyte above the calibration level of the various instruments are treated as hazardous waste. This includes the sample waste generated from the flame AA or ICP instrument. This waste is collected in a storage bottle and is disposed of as an acidic waste when the bottle is filled.

17.6.5.5 High-level inorganic wastes in organic solvents are treated in the following manner:

17.6.5.5.1 The high-level waste is placed into a clearly labeled container. When the container is full, the container is placed into the waste storage room.

17.6.5.5.2 Containers used for the storage of high-level wastes are not reused.

17.6.6 The Waste Disposal Logbook is located in close proximity to each drum. The following information is added to the logbook:

EETSE Atlanta WORK ORDER Number

Client Sample I.D. Number

Employee(s) Name(s)

Nature of Disposal

17.6.7 The Health and Safety Officer maintains a separate waste disposal record file. These files contain the master list of samples that have been disposed, TCLP analytical results, raw data, and disposal manifest receipts.

## APPENDIX I

### WASTE DISPOSAL PROCEDURES

| Waste Type                                                                         | Associated Analytical and Sample Prep Methods | Storage Procedures                                                 | Disposal Procedures                            |
|------------------------------------------------------------------------------------|-----------------------------------------------|--------------------------------------------------------------------|------------------------------------------------|
| Halogenated Solvents<br>Methylene Chloride                                         | Pesticides, Herbicides, BNA, GPC, etc.        | Store in glass bottles, then in drums.**                           | Reclaimed by HW contractor.                    |
| Freon                                                                              | Oil & Grease, Petroleum Hydrocarbons          | Store in glass bottles.                                            | Reclaimed by laboratory.                       |
| Mixed Solvents (Flammable & non-halogenated)                                       | VOC Standards, Herbicides, Pesticides         | Store in glass bottles, then in drums.                             | Disposal by HW contractor.                     |
| All neat standards                                                                 | All analyses                                  | Store in original bottles of glass/plastic bottles, then lab pack. | Disposal by HW contractor (Packed by also)     |
| Heavy Metals Solutions                                                             | Metals, COD, Chloride                         | Store in glass bottles, then in drums.                             | Disposal by HW contractor.                     |
| Acid Solutions                                                                     | Metals, General Inorganics, Extractions       | Store in glass bottles or add to neutralizing chambers.            | Neutralize; sanitary sewer.                    |
| Alkaline Solutions                                                                 | General Inorganics, Extractions               | Store in glass bottles.                                            | Neutralize; sanitary sewer.                    |
| All samples containing Organics or Inorganics exceeding hazardous waste standards* | All analytical groups                         | Store in original bottles or jars in sample custody storage area.  | Return to client or disposal by HW contractor. |

\* Hazardous Waste Characteristics (D001-D017) (40 CFR Part 261), HCN>250 mg/kg, TCLP Toxicity Characteristics (Federal Register, 55FR 11798), March 29, 1990, or contains greater than 50 ppm PCBs.

\*\* Bottles are kept in each laboratory and are periodically moved to the hazardous waste storage area.

## APPENDIX II

## LABORATORY EQUIPMENT PREVENTIVE MAINTENANCE SCHEDULE

|                                             |   | Service Interval |   |   |    |   |    |                                                        |  |  |
|---------------------------------------------|---|------------------|---|---|----|---|----|--------------------------------------------------------|--|--|
| EQUIPMENT ITEM                              | D | W                | M | Q | SA | A | AN | SERVICE LEVEL                                          |  |  |
| ICP-EETSE Atlanta and ICP-MS                |   |                  |   |   |    |   |    |                                                        |  |  |
| Pump Tubing                                 |   |                  |   | X |    |   |    | Change                                                 |  |  |
| Nebulizer                                   |   |                  | X |   |    |   |    | Clean                                                  |  |  |
| Filters                                     |   |                  | X |   |    |   | X  | Inspect - clean or replace.                            |  |  |
| Spray Chamber                               |   |                  | X |   |    |   |    | Clean                                                  |  |  |
| Quartz Torch                                |   |                  |   |   | X  |   |    | Clean and realign.                                     |  |  |
| D-Shaped Mirrors                            |   |                  | X |   |    |   | X  | Inspect - clean or replace                             |  |  |
| MERCURY ANALYZER AND AUTOSAMPLER            |   |                  |   |   |    |   |    |                                                        |  |  |
| Pump Tubing                                 | X |                  |   |   |    |   | X  | Inspect – replace                                      |  |  |
| Standard Cups                               | X |                  |   |   |    |   | X  | Inspect – replace                                      |  |  |
| Drying Tube                                 | X |                  |   |   |    |   |    | Repack                                                 |  |  |
| Mixing Coil                                 |   | X                |   |   |    |   |    | Inspect - clean or replace                             |  |  |
| Sample Probe                                |   |                  | X |   |    |   |    | Inspect - clean or replace                             |  |  |
| Mercury Lamp                                |   |                  |   |   |    |   | X  | Clean or replace                                       |  |  |
| CONDUCTIVITY METER                          |   |                  |   |   |    |   |    |                                                        |  |  |
| Battery                                     |   |                  |   |   |    |   | X  | Check or replace                                       |  |  |
| Probe Contacts                              |   |                  |   |   |    |   | X  | Clean or replace                                       |  |  |
| pH METER                                    |   |                  |   |   |    |   |    |                                                        |  |  |
| Probe(s)                                    | X |                  |   |   |    |   |    | Check fluid levels and fill                            |  |  |
| Connectors                                  | X |                  |   |   |    |   |    | Check for corrosion and clean if necessary             |  |  |
| AUTOANALYZER (TRAACS/LACHAT)                |   |                  |   |   |    |   |    |                                                        |  |  |
| Pump Platen                                 |   |                  |   |   |    |   | X  | Replace                                                |  |  |
| Pump Tubes                                  |   |                  |   | X |    |   |    | Replace                                                |  |  |
| Flow Cell                                   |   |                  |   | X |    |   |    | Inspect and clean.                                     |  |  |
| Autosampler                                 | X |                  |   |   |    |   |    | Check alignment                                        |  |  |
| Cobalt Column                               |   |                  |   |   |    |   | X  | Inspect for channeling and repack                      |  |  |
| BLOCK DIGESTER                              |   |                  |   |   |    |   |    |                                                        |  |  |
| Heating Elements                            |   |                  |   |   |    |   | X  | Replace as needed                                      |  |  |
| Thermostat                                  |   |                  |   |   | X  |   |    | Check against calibrated thermometer for accuracy      |  |  |
| UV/VIS SPECTROPHOTOMETER                    |   |                  |   |   |    |   |    |                                                        |  |  |
| Light Source                                |   |                  |   |   |    |   | X  | Replace                                                |  |  |
| Belt                                        | X |                  |   |   |    |   |    | Check for wear, replace if frayed                      |  |  |
| Cuvettes                                    | X |                  |   |   |    |   | X  | Check for scratches and buildup - replace              |  |  |
| ION SELECTIVE ELECTRODE                     |   |                  |   |   |    |   |    |                                                        |  |  |
| fluid filled probe                          | X |                  |   |   |    |   | X  | Check fluid level - empty and replace if crystals form |  |  |
| solid probe                                 | X |                  |   |   |    |   |    | Check for salt build-up on tip, clean if necessary     |  |  |
| BOMB CALORIMETER                            |   |                  |   |   |    |   |    |                                                        |  |  |
| Thermometer                                 |   |                  |   |   |    | X |    | Calibrate Thermometer                                  |  |  |
| Seals                                       | X |                  |   |   |    |   |    | Check for breaks in seals and replace if needed        |  |  |
| GAS CHROMATOGRAPH – SEMIVOLATILES           |   |                  |   |   |    |   |    |                                                        |  |  |
| Autosampler System                          |   |                  |   |   |    |   | X  | Syringe and tubing cleaned – Needles/ tubing replaced  |  |  |
| Septa                                       |   | X                |   |   |    |   |    | Replace                                                |  |  |
| Column/Injector                             |   |                  |   |   |    |   | X  | Change sleeve and cut front of guard column.           |  |  |
| Gas Cylinder                                | X |                  |   |   |    |   |    | Inspect - change when pressure reads <500 psi.         |  |  |
| GAS CHROMATOGRAPH - MASS SPEC SEMIVOLATILES |   |                  |   |   |    |   |    |                                                        |  |  |

**APPENDIX II**
**LABORATORY EQUIPMENT PREVENTIVE MAINTENANCE SCHEDULE**

| EQUIPMENT ITEM                                 | Service Interval |   |   |   |    |   |    | SERVICE LEVEL                                             |
|------------------------------------------------|------------------|---|---|---|----|---|----|-----------------------------------------------------------|
|                                                | D                | W | M | Q | SA | A | AN |                                                           |
| Column/Injector                                |                  | X |   |   |    |   |    | Change sleeve and cut front of column.                    |
| Septum                                         |                  | X |   |   |    |   |    | Replace                                                   |
| Splitless Disc                                 |                  |   |   |   | X  |   |    | Replace                                                   |
| Autosampler                                    | X                |   |   |   |    | X |    | Syringe and tubing cleaned<br>Needles and tubing replaced |
| Rough Pump                                     |                  |   |   |   |    | X |    | Oil change by HP service                                  |
| Mass Spectrometer                              |                  |   |   |   |    |   | X  | Clean                                                     |
| Gas Cylinder                                   | X                |   |   |   |    |   |    | Inspect - Change when pressure reads <500 psi.            |
| Hard Drive                                     |                  | X |   |   |    |   |    | Archive                                                   |
| <b>ATOMIC ABSORPTION</b>                       |                  |   |   |   |    |   |    |                                                           |
| Pump                                           | X                |   |   |   |    |   |    | check for leaks and corrosion                             |
| Lamps                                          |                  |   |   |   |    |   | X  | If intensity drops, replace                               |
| Nebulizer                                      |                  | X |   |   |    |   |    | Clean, sonicate                                           |
| Tubing                                         | X                |   |   |   |    |   |    | If leaking or weak, replace                               |
| Burner Head                                    |                  | X |   |   |    |   |    | Clean, sonicate                                           |
| Bottled Gases                                  | X                |   |   |   |    |   |    | Replace if pressure reaches 500 psi.                      |
| Spray Chamber                                  |                  |   | X |   |    |   |    | Clean, sonicate                                           |
| <b>GAS CHROMATOGRAPH – VOLATILES</b>           |                  |   |   |   |    |   |    |                                                           |
| Column                                         |                  |   |   |   |    |   | X  | Replace                                                   |
| Septum                                         |                  |   | X |   |    |   |    | Replace                                                   |
| Gas Cylinder                                   | X                |   |   |   |    |   |    | Inspect - change when pressure reads <500 psi.            |
| Hydrocarbon/Moisture Trap                      |                  |   |   |   |    | X |    | Replace                                                   |
| <b>GAS CHROMATOGRAPH - MASS SPEC VOLATILES</b> |                  |   |   |   |    |   |    |                                                           |
| Column                                         |                  |   |   |   |    |   | X  | Replace                                                   |
| Rough Pump                                     |                  |   |   |   |    | X |    | Oil change by HP service                                  |
| Gas Cylinder                                   | X                |   |   |   |    |   |    | Inspect - change when pressure reads <500 psi.            |
| Septum                                         |                  |   | X |   |    |   |    | Replace                                                   |
| Transfer Line                                  |                  |   |   |   |    |   | X  | Check for leaks                                           |
| <b>GAS CHROMATOGRAPH – ECD</b>                 |                  |   |   |   |    |   |    |                                                           |
| Autosampler                                    | X                |   |   |   |    | X |    | Syringe cleaned<br>Needles and tubing replaced            |
| Column                                         |                  |   |   |   |    |   | X  | Replace                                                   |
| Septa                                          |                  |   |   |   |    |   | X  | Replace                                                   |
| Glass Insert                                   |                  |   |   |   |    |   | X  | Replace                                                   |
| Gold Disk                                      |                  |   |   |   |    |   | X  | Replace                                                   |
| Gas Cylinder                                   | X                |   |   |   |    |   |    | Inspect - change when pressure reads <500 psi.            |
| EC Detector(s)                                 |                  |   |   |   |    | X |    | Send off for replacement of radioactive nickel foil.      |
| <b>GAS CHROMATOGRAPH – FID</b>                 |                  |   |   |   |    |   |    |                                                           |
| Autosampler                                    | X                |   |   |   |    |   | X  | Syringe and tubing cleaned<br>Needles and tubing replaced |
| Column                                         |                  |   |   |   |    |   | X  | Replace                                                   |
| Septa                                          |                  |   |   |   |    |   | X  | Replace                                                   |
| Gas Cylinder                                   |                  |   |   |   |    |   |    | Inspect daily, change when pressure reads <500 psi.       |
| Glow Plug                                      |                  |   |   |   |    |   |    | Determine if glow is enough to ignite Hydrogen            |



## APPENDIX II

### LABORATORY EQUIPMENT PREVENTIVE MAINTENANCE SCHEDULE

| EQUIPMENT ITEM                                                         | Service Interval |   |   |   |    |   |    | SERVICE LEVEL                                                                 |
|------------------------------------------------------------------------|------------------|---|---|---|----|---|----|-------------------------------------------------------------------------------|
|                                                                        | D                | W | M | Q | SA | A | AN |                                                                               |
| Housing and chimney                                                    |                  |   |   |   |    |   |    | Check for rust and corrosion that will cause a short, and clean if necessary. |
| Glass Insert                                                           |                  |   |   |   |    |   | X  | Replace                                                                       |
| Column                                                                 |                  |   |   |   |    |   | X  | Replace                                                                       |
| <b>PURGE AND TRAP</b>                                                  |                  |   |   |   |    |   |    |                                                                               |
| Sorbent Trap                                                           |                  |   |   |   | X  |   |    | Change                                                                        |
| Heater Pockets                                                         | X                |   |   |   |    |   |    | Check, replace if defective                                                   |
| Transfer Lines                                                         |                  |   |   |   |    |   | X  | Inspect and replace if needed                                                 |
| Purge Flow                                                             |                  |   |   |   | X  |   |    | Inspect, adjust as needed                                                     |
| <b>TCLP EQUIPMENT</b>                                                  |                  |   |   |   |    |   |    |                                                                               |
| Volatile Rotator                                                       | X                |   |   |   |    |   |    | Check rotation ( $\pm 30$ rpms)                                               |
| Semi-volatiles/Metals Rotator                                          | X                |   |   |   |    |   |    | Check rotation ( $\pm 30$ rpms)                                               |
| <b>BALANCES</b>                                                        |                  |   |   |   |    |   |    |                                                                               |
| Balances                                                               | X                |   |   |   |    |   |    | Calibrate, service annually                                                   |
| Auto-Pipettors                                                         |                  |   |   | X |    |   |    | Calibrate                                                                     |
| <b>BALANCE WEIGHTS – for daily balance checks</b>                      |                  |   |   |   |    |   |    |                                                                               |
| Set “B” – 10 weights                                                   |                  |   |   |   |    |   |    | Verified every 5 years by a body that can prove traceability to NIST          |
| <b>THERMOMETER (CERTIFIED) – for in-house thermometer calibrations</b> |                  |   |   |   |    |   |    |                                                                               |
| HB #28199 (CMI #32478) –1 to 200°C                                     |                  |   |   |   |    |   | X  | Certified every 5 years by a body that can prove traceability to NIST         |
| <b>DISSOLVED OXYGEN METER</b>                                          |                  |   |   |   |    |   |    |                                                                               |
| Batteries                                                              | X                |   |   |   |    |   |    | Check for strength, if < 13.20 replace                                        |
| Membrane                                                               |                  |   |   | X |    |   |    | Replace. Sooner if signal will not stabilize                                  |
| Spill housing and stirrer                                              | X                |   |   |   |    |   |    | Clean                                                                         |

The service intervals listed in Appendix II are as follows: D = daily; W = weekly; M = monthly; Q = quarterly; SA = semi-annually; and AN = as needed.

## APPENDIX III LAB EQUIPMENT LIST

| ID No. | Instrument        | Type                           | Manufacturer             | Model         | Serial Number | Age  |
|--------|-------------------|--------------------------------|--------------------------|---------------|---------------|------|
| 1002   | MS-4              | GC                             | HP                       | 6890          | 430021BJ4     | 1999 |
| 1003   | MS-4              | MS                             | HP                       | 5973          | US82311468    | 1999 |
| 1006   | MS-5              | GC                             | Agilent                  | 6850          | US00001050    | 2001 |
| 1007   | MS-5              | MS                             | Agilent                  | 5973          | US94240080    | 2001 |
| 1010   | MS-7              | GC                             | Agilent                  | 6850          | US00001051    | 2001 |
| 1011   | MS-7              | MS                             | Agilent                  | 5973 Network  | US94240092    | 2001 |
| 1015   | MS-8              | MS                             | Agilent                  | 5973          | US94240107    | 2001 |
| 1032   | MS-6              | GC                             | HP                       | 6890          | US00021363    | 1999 |
| 1033   | MS-6              | MS                             | HP                       | 5973          | US80310957    | 1999 |
| 1034   | MS-6              | Auto Sampler                   | Agilent                  | G2614A        | US00807551    | 1999 |
| 1040   | HPLC-1            | Degasser                       | HP                       | G1322A        | JP73017078    | 1999 |
| 1043   | HPLC-1            | Colcom                         | HP                       | G1316A        | DE91609970    | 1999 |
| 1046   | HPLC-1            | Interface                      | HP                       | 35900E        | CNDDQ1250     | 1999 |
| 1129   | TurboVap          | Concentrator                   | Zymark                   | TurboVap II   | TV9909N8714   |      |
| 1187   | MS-9              | GC                             | Agilent                  | 6890N         | US10133113    | 2000 |
| 1188   | MS-9              | MS                             | Agilent                  | 5973 Network  | US10441238    | 2000 |
| 1189   | MS-9              | Auto Sampler                   | Agilent                  | G2614A        | US12419350    | 2000 |
| 1210   | MS-10             | GC/MS                          | Agilent                  | 5973          | US82311282    | 1998 |
| 1211   | MS-10             | GC/MS                          | Agilent                  | 6890          | US00024777    | 1998 |
| 1212   | MS-10             | Autosampler                    | Agilent                  | 7683          | US84302879    | 2001 |
| 1265   | Microscope        | M2 LabScope                    | LW Scientific            | LW 200        | 301473        |      |
| 1305   | Microscope        | Microscope                     | Nikon                    | Y52-T         | 159996        | 2002 |
| 1309   | Microscope        | Microscope                     | Olympus                  | BH2           |               |      |
| 1313   | Microscope        | Microscope                     | Olympus                  | SZ30          |               |      |
| 1503   | MS-12             | 5973                           | HP                       | 5973          | US81221559    | 2003 |
| 1504   | MS-12             | 6890/GC                        | HP                       | 6890          | DE00020822    | 2003 |
| 1505   | MS-12             | Sample Concentrator            | OI Corporation           | 4660          | A350466159    | 2003 |
| 1538   | GC-7              | GC (ECD)                       | Agilent                  | 6890N         | CN10427041    | 2004 |
| 1539   | GC-7              | Tower                          | Agilent                  | 7683          | CN42437159    | 2004 |
| 1602   | MS-7              | Concentrator                   | OI Analytical            | Eclipse 4660  | B421466132P   | 2004 |
| 1604   | SPE               | Speed-Vap III Evaporation Unit | Horizon Tech             | Speed Vap III | 42041         | 2004 |
| 1609   | IC2               | ICS 1000 Ion Chrom. Sys        | Dionex                   | ICS-1000      | 5010499       | 2005 |
| 1620   | MS-13             | GC                             | Agilent                  | 6850N         | US10506012    | 2005 |
| 1621   | MS-13             | MS                             | Agilent                  | 5973N         | US52047399    | 2005 |
| 1674   | GC-8              | GC-8                           | Agilent                  | 6890N         | CN 10609020   | 2006 |
| 1675   | Injector          | Injector (Tower)               | Agilent                  | 7683B         | CN603330862   | 2006 |
| 1676   | ALS Sampling Tray | ALS Sampling Tray              | Agilent                  | G2614A        | CN60638448    | 2006 |
| 1695   | MS-15             | Sample Concentrator            | OI Analytical            | 4660          | D63646651P    | 2006 |
| 1700   | Balance           | #12 Analytical                 | Mettler                  | AL104         | 1227330378    | 2006 |
| 1707   | MS-14             | MS                             | Agilent                  | 5975B VL MSD  | US62714424    | 2006 |
| 1708   | MS-14             | GC                             | Agilent                  | 6890 N        | CN10631084    | 2006 |
| 1709   | MS-14             | Autosampler                    | Agilent                  | 7683B         | CN63835818    | 2006 |
| 1717   | Balance           | #13 Analytical                 | Mettler                  | AL104         | 1227300041    | 2007 |
| 1722   | Stage Micrometer  |                                | Microscope Service, Inc. | L & W         |               |      |
| 1728   | MS-15             | GC                             | Agilent                  | 6850A         | US10710001    | 2007 |
| 1729   | MS-15             | MS                             | Agilent                  | 5973 Inert    | US44610842    | 2007 |

| ID No. | Instrument          | Type                          | Manufacturer          | Model                   | Serial Number   | Age   |
|--------|---------------------|-------------------------------|-----------------------|-------------------------|-----------------|-------|
| 1730   | MS-5                | Concentrator                  | OI Corporation        | Eclipse 4660            | D713466088P     | 2007  |
| 1837   | Microscope          | Meiji PLM Asbestos Microscope | MilesCo Scientific    | ML6130                  | 600091          | 2008  |
| 1838   | MS-13               | Concentrator                  | OI Analytical         | Eclipse 4660            | D807466325P     | 2008  |
| 1849   | Hot Block           | Hot Block                     | Environmental Express |                         |                 | 2005  |
| 1888   | Concentrator        | TurboVap II                   | Zymark                |                         | TV0116N10262    | 2001  |
| 1900   | Turbovap II         | Concentration Workstation     | Caliper Life Sciences | 103187                  | TV0953N15641    | 2010  |
| 1924   | MS-16               | Sampler Concentrator          | OI Corporation        | Eclipse 4660            | E008466762P     | 2010  |
| 1930   | MS-16               | GC                            | Agilent               | 7820A                   | CN10202030      | 2010  |
| 1931   | MS-16               | MS                            | Agilent               | 5975                    | US10200403      | 2010  |
| 1955   | MS-8/GC-19          | Autosampler                   | EST Analytical        | Centurion               | 416080003183    | 2011  |
| 1988   | ICP/MS-Agilent      | ICPMS                         | Agilent               | 7700X Series (G3281A)   | JP11391304      | 2013  |
| 1989   | Autosampler         | ICP/MS Autosampler            | Agilent               | ASX-500 Series (G3286A) | US10167A520     | 2013  |
| 1997   | Sonicator           | Ultrasonic                    | Branson               | 3510R-DTH               | RMC060027670E   | 2000  |
| 1999   | Balance             | Toploader                     | Mettler-Toledo        | PL3002                  | 1227190170      | 2005  |
| 2003   | Balance             | Analytical                    | Mettler Toledo        | AB104-S                 | 1121311765      | 2003  |
| 2004   | Balance             | Toploader                     | Mettler Toledo        | PM4800                  | M86379          | 2004  |
| 2005   | Balance             | Toploader                     | Setra                 | SI 2000S                | 2644872         | 2005  |
| 2006   | COD Reactor         | Block                         | HACH                  | #45600-00               | 9.512E+11       | 2002  |
| 2007   | BOD Incubator       | Refrigerator                  | VWR (Sheldon Mfg.)    | #9110593                | 11055305        | 2002  |
| 2018   | Oven                | Drying                        | Quincy Labs           | 10GC                    | NG1-009030      | 2011  |
| 2020   | Hot Block           | Hot Block                     | Environmental Express | SC154                   | 8826CEWCW789    | 2013  |
| 2021   | Simple Dist         | Distillation Apparatus #1     | Environmental Express | C6000                   | N/A             | 2013  |
| 2022   | Simple Dist         | Distillation Apparatus #2     | Environmental Express | C6000                   | N/A             | 2013  |
| 2036   | VOA Cooler          | Walk-in                       | Commercial Refrig.    | 4G3                     | 5605266         | 2000  |
| 2060   | Electron Microscope | TEM                           | Philips               | EM-420                  | 943206007001    | ~1985 |
| 2063   | BOD Incubator       | Precision                     | Kenmore               | MFU20F3GW7              | 699111788       | 2014  |
| 2065   | Balance             | Analytical                    | Fisher                | Item # ALF64            | N0588330030008P | 2010  |
| 2067   | Balance             | Analytical                    | Mettler               | AE160                   | 0578            | 2002  |
| 2069   | Lachat-3            | Quick Chem QC8500             | Lachat                | Series 2                | 140600001703    | 2014  |
| 2070   | Lachat-3 Pump       | Reagent Pump RP-1500          | Lachat                | SM1135                  | 549285-2        | 2014  |
| 2088   | Water Bath          |                               | Thermo Electric       | 2866                    | 201405          | 2008  |
| 2092   | MS-17               | GC                            | Agilent               | 7890B                   | CN14403051      | 2014  |
| 2093   | MS-17               | MS                            | Agilent               | 5977A                   | US1441M401      | 2014  |
| 2100   | Turbidity Meter     | Turbidimeter                  | Lovibond              | Lot# 7374               | 3078            | 2014  |
| 2101   | MS-17               | Cleaning Module               | Entech                | 3100D                   | 1687            | 2014  |
| 2102   | MS-17               | Oven                          | Entech                | 09-0V6L-12              | 0135            | 2014  |
| 2103   | MS-17               | Diluter                       | Entech                | 4700                    | 0026            | 2014  |
| 2105   | MS-17               | Autosampler                   | Entech                | 7650                    | 0025            | 2014  |
| 2108   | GC-9                | GC                            | Agilent               | 7890B (G3440B)          | CN14483265      | 2015  |
| 2109   | GC-9                | Auto Sampler Tray             | Agilent               | 7693 (G4514A)           | CN14380119      | 2015  |
| 2110   | GC-9                | Tower                         | Agilent               | 7693 (G4513A)           | CN14490172      | 2015  |
| 2111   | GC-9                | ECD (Front)                   | Agilent               | G2397A                  | U26039          | 2015  |
| 2112   | GC-9                | ECD (Back)                    | Agilent               | G2397A                  | U26040          | 2015  |
| 2114   | Autosampler         | IC Autosampler                | Dionex                | AS40-1                  | 96040432        | 1999  |
| 2120   | MS-13               | Autosampler                   | EST Analytical        | Centurion               | CentW502100614  | 2014  |
| 2131   | GC-9                | ECD Cell                      | Agilent               | G2397-60610             | U25762          | 2015  |
| 2143   | Zero Air Generator  | FID                           | Whatman               | 76-803                  | 76-803          | 2013  |

| ID No. | Instrument                     | Type                      | Manufacturer          | Model                     | Serial Number    | Age  |
|--------|--------------------------------|---------------------------|-----------------------|---------------------------|------------------|------|
| 2148   | ICP-OES                        | OES-1                     | Agilent               | 5100                      | MY15120005       | 2015 |
| 2158   | Oven                           | Drying                    | Quincy Lab, Inc.      | S430`5                    | G4-007992        | 2015 |
| 2165   | Oven                           | Drying Oven               | Quincy Labs, Inc.     | GC Series (Cat. S43015)   | G4-008013        | 2015 |
| 2173   | GC-10                          | 6890 GC System            | HP                    | 6890 (G1530A)             | US00006903       | 2015 |
| 2178   | GC-10                          | 6890 Injector             | HP                    | 6890 (18593B)             | 3042A23879       | 2015 |
| 2191   | TKN Block Digestor             | Block                     | Environmental Express | TKN100                    | 2015TKNBC105     | 2015 |
| 2195   | BOD Incubator                  | Refrigerator              | Thermo Scientific     | 815                       | 300033500        | 2015 |
| 2221   | Oven                           | 180L Ovn Gravity          | Fisher                | 151030521                 | 41880516         | 2016 |
| 2225   | Oven                           | 180L Ovn Grvty            | Fisher                | 151030521                 | 41921243         | 2016 |
| 2233   | Spectrophotometer              | SPEC-4                    | Hach                  | DR3900                    | 1669679          | 2016 |
| 2246   | Autosampler                    | for Lachat                | Cetac Technologies    | ASX-520                   | 070570A520       | 2011 |
| 2247   | Dilutor                        | for Lachat                | Lachat                | PDS 200                   | 50700000344      | 2011 |
| 2249   | Balance                        | Precision Advanced        | OHAUS                 | GT 4100                   | 8709             | 2007 |
| 2261   | MS-19                          | Autosampler               | EST Analytical        | Centurion                 | 462071416        | 2016 |
| 2282   | Turbidimeter                   | White Light/Tungsten Lamp | Lovibond              | 194200                    | 3463             | 2016 |
| 2285   | GC-11                          | 7890B GC System           | Agilent               | 7890B (G3440B)            | CN16473170       | 2016 |
| 2286   | GC-11                          | 7890B ALS Tray            | Agilent               | G4567A                    | CN15030021       | 2016 |
| 2291   | Total Organic Carbon           | TOC-3                     | Shimadzu              | TOC-L CPN                 | H54315432055 CS  | 2017 |
| 2292   | TOC Autosampler                | 40 mL                     | Shimadzu              | ASI-L                     | H57415401560 SA  | 2017 |
| 2293   | Mercury (Hg) Digest / Analyzer | HG-2 Soil Combustion      | Nippon                | MS-3000                   | 15740318         | 2017 |
| 2294   | Reagent Module                 |                           | Nippon                | RD-3                      | 13420832         | 2017 |
| 2295   | Liquid Sampler                 | Autosampler               | Nippon                | SC-3                      | 13410578         | 2017 |
| 2296   | Mercury (Hg) Digest / Analyzer | HG-1 CVAA                 | Nippon                | RA-4500                   | 15780180         | 2017 |
| 2298   | MS-18                          | GC                        | Agilent               | 7890B GC                  | CN15173094       | 2017 |
| 2299   | MS-18                          | MS                        | Agilent               | 5977B MSD                 | US1715M029       | 2017 |
| 2300   | MS-18                          | Autosampler               | Agilent               | G4567A                    | CN15250014       | 2017 |
| 2301   | MS-18                          | vacuum pump               | Pfeiffer              | DUO2.5                    | 22032890         | 2017 |
| 2302   | Station 1                      | PLM Hood                  | Plexiglass            | with Hepa-Filter          |                  | 1999 |
| 2303   | Station 2                      | PLM Hood                  | Plexiglass            | with Hepa-Filter          |                  | 1999 |
| 2304   | Station 3                      | PLM Hood                  | Plexiglass            | with Hepa-Filter          |                  | 1999 |
| 2305   | Station 4                      | PLM Hood                  | Plexiglass            | with Hepa-Filter          |                  | 1999 |
| 2306   | Thermo-Anemometer              | Velometer                 | Extech                | AN300                     | Z350828          | 2017 |
| 2307   | Vulcan 84 Auto Metals Digestor | Automated Hot Block       | Questron Technologies | V84-P                     | VU17-1027-V1.1.1 | 2017 |
| 2309   | Flame Atomic Absorption (FAA)  | 240 AA                    | Agilent               | G8431A                    | MY17220002       | 2017 |
| 2311   | Soil TOC Analyzer              | Soil Analyzer             | Shimadzu              | SSM-5000A                 | H52735400079 NK  | 2017 |
| 2317   | Oven                           | Drying                    | Quincey Labs          | 40GC                      | G4-008938        | 2017 |
| 2318   | Centrifuge                     | Clinical                  | IEC                   |                           | 42832385         | 2017 |
| 2320   | MS-4                           | Concentrator              | EST Analytical        | Evolution                 | EV806012517      | 2017 |
| 2321   | MS-19                          | Concentrator              | EST Analytical        | Evolution                 | EV850061517      | 2017 |
| 2322   | MS-5                           | Autosampler               | EST Analytical        | Centurion                 | CENTW597072017   | 2017 |
| 2332   | Balance                        | Analytical                | U.S. Solid            | USS-DBS5                  | USS-DBS1709029   | 2017 |
| 2334   | Evaporator                     | Speed Vap IV              | Horizon Technology    | Speed Vap IV              | 17-0109          | 2017 |
| 2339   | Zero Air Generator             | 3500cc                    | Peak Scientific       | Precision Zero Air 3500cc | 770004350        | 2017 |

| ID No. | Instrument                        | Type                            | Manufacturer               | Model                    | Serial Number    | Age    |
|--------|-----------------------------------|---------------------------------|----------------------------|--------------------------|------------------|--------|
| 2341   | Compressed Air Generator          | Compressor                      | Peak Scientific            | Precision Compressed Air | 770004231        | 2017   |
| 2345   | Hydrogen Generator                | Precision                       | Peak Scientific            | Hydrogen Trace 500 cc    | 770005503        | 2017   |
| 2350   | MS-19                             | GC                              | Agilent                    | 7820A                    | CN1723204        | 2017   |
| 2351   | MS-19                             | MS                              | Agilent                    | 5977B MSD                | US1741R002       | 2017   |
| 2360   | Autosampler                       | ICP/MS Autosampler SPS 4        | Agilent                    | G8410A                   | AU17092619       | 8/2017 |
| 2362   | COD Reactor                       | Digital Reactor Block           | Hach                       | DRB 200                  | 17120C0305       | 2018   |
| 2363   | Energy Dispersive Spectrometer    | EDAX (TEM Detector)             | EDAX (Amtek)               | Octane-T-Plus            | 5480             | 2017   |
| 2364   | High Vacuum Evaporator            | Carbon Coater                   | Denton                     | DV-502A                  | 19664            | 2017   |
| 2367   | Microwave Extractor               | Ethox X                         | Milestone                  | 49380                    | 17122726         | 2018   |
| 2368   | Discrete Analyzer                 | DA-1 rAPID-T                    | Astoria-Pacific            | 4600                     | 4660-1046        | 2018   |
| 2373   | pH Meter                          |                                 | Fisher Scientific          | accumet AE150            | ae95002608       | 2018   |
| 2380   | Discrete Analyzer                 | DA-2 rAPID-T                    | Astoria-Pacific            | 4600                     | 4660-1053        | 2018   |
| 2381   | Balance                           | Analytical                      | U.S. Solid                 | USS-DBS5                 | USS-DBS1803053   | 2018   |
| 2382   | Balance                           | Analytical                      | U.S. Solid                 | USS-DBS5                 | USS-DBS1803045   | 2018   |
| 2394   | Automated Hot Block               | Vulcan 84 Auto Metals Digester  | Questron Technologies      | V84-P                    | VN-1002          | 2018   |
| 2395   | Automated Hot Block               | Vulcan 84 Auto Metals Digester  | Questron Technologies      | V42P                     | VU18-1005-V1.1.1 | 2018   |
| 2396   | Water Bath                        | Coliform Incubator Water Bath   | Thermo Scientific          | TSCOL35                  | 300209073        | 2018   |
| 2397   | Mercury (Hg) Digest / Analyzer    | HG-3 CVAA                       | Nippon                     | RA-4500                  | 17780287         | 2018   |
| 2398   | Pensky Marten Flashpoint Analyzer | Supplier: Lazar Scientific, inc | Stanhope-Seta              | 35000-0 U                | 1053813          | 2018   |
| 2400   | ICP-OES                           | OES-2                           | Agilent                    | 5100                     | MY15500001       | 2018   |
| 2401   | Autosampler                       | CETAC                           | CETAC                      | ASX-520                  | 101525A520       | 2018   |
| 2421   | MS-17                             | Concentrator                    | Entech                     | 7200CTS                  | 1595             | 2014   |
| 2434   | HPLC-1                            | ALS                             | HP                         | G1313A                   | DE65102508       | 2005   |
| 2439   | Auto Titrator                     |                                 | Thermo Scientific          | T910                     | T10147           | 2018   |
| 2440   | Probe                             | ATC Probe                       | Thermo Scientific          | 927007MD                 | WT1-12782        | 2018   |
| 2441   | Electrode                         | ROSS Ultra pH Electrode         | Thermo Scientific          | 8102BNUWP                |                  | 2018   |
| 2442   | Sonicator                         | Dismembrator                    | Fisher Scientific          | F550                     | F1768            | 2018   |
| 2444   | Meter                             | pH Meter Digital Unit           | Thermo Scientific          | VSTAR10                  | V13409           | 2018   |
| 2450   | Waterbath                         | KD Concentration                | Fisher Scientific          | FSGPD20                  | 300207609        | 2018   |
| 2452   | ICP/MS                            | ICP/MS - 2 / 7900               | Agilent                    | 7900                     | SG18404244       | 2018   |
| 2454   | Autosampler                       | MS-12                           | OI Analytical              | 4100 Sample Processor    | D833410620       | 2018   |
| 2455   | MS-16/GC-19                       | Concentrator                    | OI Analytical              | 4760 Eclipse             | A832447935       | 2018   |
| 2458   | Microscope                        | PLM Stereomicroscope            | LW Scientific (Thomas Sci) | Z4 Zoom Stereoscope      | Z4H-BSF7-77SE    | 2019   |
| 2459   | GC-12                             | 6850A GC System                 | Agilent                    | 6850A                    | US10540009       | 2004   |
| 2460   | GC-12                             | 6850A ALS Tray                  | Agilent                    | G2880A                   | CN53821085       | 2004   |
| 2462   | Spectrophotometer                 | SPEC-6                          | Thermo Scientific          | Genesys 30               | 9A1W264118       | 2018   |
| 2464   | Concentrator                      | Turbovap II                     | Zymark                     |                          | 4373             | 2018   |
| 2469   | GC-14                             | 6850A GC System                 | Agilent                    | 6850A                    | US10406012       | 2013   |
| 2470   | GC-14 Autosampler                 | 6850 Autosampler                | Agilent                    | 6850 (G2880A)            | CN14520114       | 2013   |
| 2472   | Centrifuge                        |                                 | International Equip Co     | Model CL                 | 428-18881        | 2009   |



| ID No. | Instrument                  | Type                                 | Manufacturer             | Model                           | Serial Number   | Age  |
|--------|-----------------------------|--------------------------------------|--------------------------|---------------------------------|-----------------|------|
| 2485   | Balance                     | Top Loader                           | RADWAG                   | WTC 2000                        | 485747          | 2010 |
| 2486   | ZHE Tumbler                 | Tumbler                              | Bodine Electric Co       | 42R5BFC1-E3                     | 068UU2038       | 2012 |
| 2487   | Pump                        | GAST Pump                            | GAST                     | DQA-V751-FB                     | 5KA84           | 2018 |
| 2488   | Scale                       | Scale                                | Measure Tex              | PS-102-200                      | 101800034       | 2019 |
| 2490   | Oven                        | Oven for Filtration #2               | Quincy Lab Inc.          | 40GC                            | G4-009651       | 2019 |
| 2491   | Spectrophotometer           | SPEC-7                               | Shimadzu                 | Biospec-1601                    | A1075           | 2019 |
| 2492   | Centrifuge                  |                                      | Damon/IEC Division       | IEC Clinical Centrifuge         | AF0523          | 2015 |
| 2494   | Discrete Analyzer           | DA-3                                 | rAPID-T                  | 4600                            | 4660-1061       | 2019 |
| 2495   | Discrete Analyzer           | DA-4                                 | rAPID-T                  | 4600                            | 4660-1062       | 2019 |
| 2509   | Pump                        | Sample Introduction Pump for FAA-240 | Varian                   | VGA-77                          | 95081021        | 2019 |
| 2512   | Discrete Analyzer           | DA-5                                 | rAPID-T                  | 4600                            | 4660-1067       | 2019 |
| 2514   | Balance                     | Top Loader                           | RADWAG                   | WTC 2000                        | 607423          | 2019 |
| 2515   | Balance                     | Top Loader                           | RADWAG                   | WTC 2000                        | 607428          | 2019 |
| 2522   | Balance                     | Analytical                           | Mettler Toledo           | ML204                           | B110120209      | 2019 |
| 2526   | Balance                     | Analytical                           | Mettler Toledo           | AE240                           | G50492          | 1995 |
| 2527   | Meter                       | Conductivity/pH Meter                | Oakton                   | pH/Con 10 Series                | 101196          | 2010 |
| 2528   | Meter                       | Conductivity/pH Meter                | Oakton                   | pH/Con 10 Series                | 76106           | 2010 |
| 2530   | Flow Meter                  | Flow Meter                           | Restek                   | Pro-Flow 6000                   | RE103967        | 2017 |
| 2531   | Balance                     | Top Loader                           | Radwag                   | WTC2000                         | 607498          | 2018 |
| 2532   | Centrifuge                  | IEC Clinical Centrifuge              | Damon/IEC                | IEC Clinical Centrifuge 4-place | AF 2603         | 2010 |
| 2533   | Flow Meter                  | Flow Meter                           | Pro-Flow                 | 6000                            | RE107496        | 2019 |
| 2535   | GC-15                       | GC Unit                              | Agilent                  | 6850A                           | US10305001      | 2009 |
| 2536   | GC-15 Autosampler           | Autosampler                          | Agilent                  | G2880A                          | CN31220462      | 2009 |
| 2538   | MS-7                        | Autosampler                          | EST Analytical           | Centurion                       | CENTW687040219  | 2019 |
| 2539   | MS-4                        | Autosampler                          | EST Analytical           | Centurion                       | CENTS625040219  | 2019 |
| 2540   | Pump                        | Hi Flow Sampler                      | Gilian                   | HFS 113A                        | 850030          | 2010 |
| 2543   | Titration                   | Autotitrator                         | Thermo Fisher Orion      | Orion T910                      | T10233          | 2019 |
| 2544   | Probe                       | pH Electrode                         | Thermo Fisher            | Ross Ultra                      | 8102BNUWP       | 2019 |
| 2546   | Dilutor                     | LaChat Dilutor                       |                          | DRD                             | A89000-1192     | 2009 |
| 2548   | Pump                        | Vacuum Pump                          | Allegro                  | D-2 Mold Lite                   | 16286           | 2009 |
| 2549   | Automated Soxhlet Extractor | Soxtherm                             | Gerhardt                 | SOX 416                         | 1/8465 19 0009  | 2019 |
| 2551   | Meter                       | pH Meter                             | Mettler Toledo           | SevenEasy pH                    | 1231275091      | 2000 |
| 2555   | TEM Digital Camera          | Digital                              | SIA                      | SIA-L3C                         | ML0081508       | 2016 |
| 2557   | Probe                       | Conductivity                         | Thermo Fisher Orion      | 013005MD                        | 248910-A01      | 2019 |
| 2580   | Bod Incubator               | Incubator                            | Norlake                  | LR1201WWW/0                     | 1502550         | 2020 |
| 2583   | MS-15                       | Autosampler                          | EST Analytical           | Centurion                       | CENTW1726012220 | 2020 |
| 2584   | MS-16                       | Autosampler                          | EST Analytical           | Centurion                       | CENTW727012220  | 2020 |
| 2585   | SPS4 Autosampler            | Metals Autosampler                   | Agilent                  | G8410A                          | AU18164857      | 2020 |
| 2588   | Water Bath                  | Adjustable Temperature               | Fisher                   | FSGPD20                         | 3003855776      | 2020 |
| 2592   | Probe                       | Redox (ORP)                          | Thermo Fisher Scientific | 9180BNMD                        | 248994-A01      | 2020 |
| 2593   | Quanti-Tray Sealer          | Tray Sealer                          | Idexx                    | 89-10894-04                     | QT04545-06-073  | 2020 |
| 2603   | IC-4                        | Ion Chromatograph                    | Thermo-Fisher (Dionex)   | Integrion                       | 20043128        | 2018 |
| 2604   | IC-4 Autosampler            | Autosampler                          | Thermo-Fisher (Dionex)   | AS-AP (P/N 074922 no cooling)   | 20043210        | 2019 |
| 2607   | Nitrogen Generator          | Nitrogen Generator                   | Peak Scientific          | Precision Nitrogen Trace 600cc  | 771053987       | 2020 |



| ID No. | Instrument                         | Type                                       | Manufacturer             | Model                       | Serial Number            | Age  |
|--------|------------------------------------|--------------------------------------------|--------------------------|-----------------------------|--------------------------|------|
| 2608   | TOC-4                              | TOC Analyzer                               | Shimadzu                 | TOC-L CPN                   | H54315332035 CS          | 2017 |
| 2609   | KD Evaporator                      | Solvent Evaporator                         | Organomation             | 16165 (PN12018)             | 63500                    | 2020 |
| 2611   | Rotary Agitator                    | Agitator/Tumbler                           | EETSE Atlanta            | EETSE Atlanta-3000          | N/A                      | 2020 |
| 2612   | Rotary Agitator                    | Agitator/Tumbler                           | EETSE Atlanta            | EETSE Atlanta-3000          | N/A                      | 2020 |
| 2613   | Rotary Agitator                    | Agitator/Tumbler                           | Analytical Testing Corp  | DC-20                       | 5046XFCF0003             | 2020 |
| 2614   | Hot Block                          | Hot Block                                  | Environmental Express    | SC154                       | 2020CECW5369             | 2020 |
| 2616   | Incubator                          | VWR Forced Air 6.3 CF (Type Code 51030020) | VWR                      | Cat# 89511-428              | 42586417                 | 2020 |
| 2618   | Sonicator                          | Ultrasonic Cleaner                         | Hardwarefactorystore.com | JPS-20A                     | None listed              | 2020 |
| 2619   | Rotary Agitator                    | Agitator/Tumbler                           | Analytical Testing Corp  | DC-20                       | 5046XFCF0015             | 2020 |
| 2622   | Microscope                         | LW i4 Infinity Microscope                  | LW                       | i4 Infinity                 | G2020015050              | 2020 |
| 2623   | Microscope Camera                  | Mini Vid USB Microscope Camera             | LW                       | TP 605100                   | C1803140389              | 2020 |
| 2624   | Water Bath                         | Precision Shaking Water Bath               | Thermo Scientific        | GTTSSWB15                   | 300433831                | 2020 |
| 2625   | Rotary Agitator                    | Agitator/Tumbler                           | EETSE Atlanta            | EETSE Atlanta-3000          | N/A                      | 2020 |
| 2626   | Rotary Agitator                    | Agitator/Tumbler                           | EETSE Atlanta            | EETSE Atlanta-3000          | N/A                      | 2020 |
| 2636   | Discrete Analyzer                  | DA-6 rAPID-T                               | Astoria-Pacific          | 4600                        | 4660-1091                | 2021 |
| 2639   | SPS 4                              | Auto Sampler                               | Agilent                  | G8410A                      | AU17092619               | 2020 |
| 2640   | Microscope                         | Zoom Stereo Scope                          | LW-Scientific            | Z4M-BZM7-7LL3               | 20810047                 | 2021 |
| 2656   | Centrifuge                         | Clinical Centrifuge                        | International Equip Co   | CL                          | AA0887                   | -    |
| 2657   | Autosampler                        | Autosampler                                | Agilent                  | SPS 4                       | AU17494209               | 2021 |
| 2669   | HPLC Variable Wave Detector        | Detector                                   | Agilent                  | G1314F                      | DE62974795               | 2021 |
| 2670   | Dissolved O2 probe                 | Dissolved O2 probe                         | YSI                      | 5905                        | 59882                    | 2021 |
| 2672   | Flash Point Tester                 | Electrically-Heated Flash Point Tester     | Koehler                  | K16203                      | K1620310276F             | 2021 |
| 2673   | Analytical Balance                 | Analytical Balance                         | Mettler                  | AE163                       | FNR 38500                | -    |
| 2677   | TDS Manifold #4                    | Manifold                                   | Environmental Express    | M3026P                      | N/A                      | 2021 |
| 2678   | GC-16                              | GC System 6850                             | Agilent                  | 6850A(G2630A)               | US10309007               | 2021 |
| 2680   | Shaking Incubator                  | Shaker                                     | BEING                    | BIS-3                       | 190412422                | 2021 |
| 2683   | Incubator                          | Air Incubator 6.3 CF                       | VWR                      | 89511-428                   | 42758434                 | 2021 |
| 2684   | Oven                               | Oven (Sodium Sulfate)                      | Waring                   | WPO750                      | 4H03 4020                | 2021 |
| 2686   | pH Meter                           | Orion Versa Star Pro (VSTAR)               | Thermo Scientific        | VSTAR-10                    | V17182                   | 2021 |
| 2687   | Microscope Eyepiece Camera         | Microscope Digital Camera                  | Amscope                  | MD500                       | 2105171445               | 2021 |
| 2691   | Shaking Incubator                  | Shaker                                     | Scientific Industries    | SI-G100 GTS-100             | GTS10-1039               | 2021 |
| 2693   | 3180 Autosampler                   | Autosampler for FS 3700                    | OI Analytical            | ASX-280                     | 062118A280               | 2021 |
| 2694   | FS 3700 Analyzer                   | Auto Analyzer (FSA)                        | OI Analytical            | 3700                        | 21G103781                | 2021 |
| 2696   | Mantech Autosampler                | Autosampler Automax 73                     | Gilson                   | Automax 73                  | 192E1172                 | 2021 |
| 2697   | Mantech Conductivity Meter         | Conductivity Meter                         | Jenway by Cole-Parmer    | 4510                        | 80713                    | 2021 |
| 2699   | Titration + Buret Modules          | Titration + Buret                          | Mantech                  | PC-1300-475 / PC-1000-1040  | MT-2E1-1088 / MT-2D1-348 | 2021 |
| 2700   | Interface Module + Stirrer Control | Interface Module + Stirrer                 | Mantech                  | PC-1000-102/4 / PC-1000-388 | MT-2G1-882 / MT-2F1-414  | 2021 |

| ID No. | Instrument                     | Type                            | Manufacturer            | Model                        | Serial Number   | Age  |
|--------|--------------------------------|---------------------------------|-------------------------|------------------------------|-----------------|------|
| 2701   | pH Probe                       | Probe                           | Mantech                 | PCE-80-PH1200D               | 8679            | 2021 |
| 2704   | ORP Probe                      | Probe                           | Mantech                 | PCE-80-OR1002                | 8769            | 2021 |
| 2705   | Leak Detector                  | Leak Detector                   | Restek                  | 28500                        | 113070          | 2021 |
| 2706   | ML BOD Analyzer                | BOD Analyzer                    | SEAL Analytical         | ML V3 200L 4BOD YSI          | 8629            | 2021 |
| 2707   | Probe 1                        | Optical DO Probe - 1            | YSI                     | ProOBOD Probe #626400        | 20K101767       | 2021 |
| 2708   | Probe 2                        | Optical DO Probe - 2            | YSI                     | ProOBOD Probe #626400        | 20K101765       | 2021 |
| 2710   | Probe 4                        | Optical DO Probe - 4            | YSI                     | ProOBOD Probe #626400        | 21D101959       | 2021 |
| 2711   | Meter                          | DO Meter 1                      | YSI                     | ProDIGITAL / ProSolo #626650 | 21A103064       | 2021 |
| 2712   | Meter                          | DO Meter 2                      | YSI                     | ProDIGITAL / ProSolo #626650 | 21A103063       | 2021 |
| 2713   | Meter                          | DO Meter 3                      | YSI                     | ProDIGITAL / ProSolo #626650 | 21A103062       | 2021 |
| 2714   | Meter                          | DO Meter 4                      | YSI                     | ProDIGITAL / ProSolo #626650 | 21A103066       | 2021 |
| 2719   | Sonic Dismembrator             | Sonicator                       | Fisher Scientific       | FB505                        | 123124AT-10-21  | 2021 |
| 2722   | Microscope                     | Zoom Stereo Microscope          | LW Scientific           | Z4                           | Z4B-BSED-7LL3-B | 2021 |
| 2727   | GC Injector/Autosampler        | GC Injector/Autosampler         | Agilent                 | 7683B                        | CN80647118      | 2021 |
| 2728   | GC-17                          | 6850 GC                         | Agilent Technologies    | 6850                         | CN11733003      | 2021 |
| 2729   | GC-18                          | 6850 GC                         | Agilent Technologies    | 6850                         | CN11734006      | 2021 |
| 2730   | GC-19 (MS-8)                   | 6850 GC                         | Agilent Technologies    | 6850                         | CN11734005      | 2021 |
| 2732   | pH Probe                       | ROSS Ultra pH Electrode         | Thermo Scientific       | 8302BNUMD                    | ZQ1-16773       | 2021 |
| 2736   | Autosampler GC-17              | 6850 ALS                        | Agilent Technologies    | G2880A                       | CN72900010      | 2021 |
| 2737   | Autosampler GC-18              | 6850 ALS                        | Agilent Technologies    | G2880A                       | CN73200010      | 2021 |
| 2741   | Peristaltic Pump               | Pump for FS 3700                | Cole-Parmer, Ismatec    | 61010A-1/ISM939E             | M21006598       | 2022 |
| 2742   | Environmental Express Manifold | Distillation                    | Environmental Express   | C6018                        | N/A             | 2022 |
| 2746   | Purge&Trap Autosampler         | VOC Autosampler                 | EST Analytical          | Centurion                    | CENTS844012522  | 2022 |
| 2747   | Purge & Trap                   | Purge&Trap                      | EST Analytical          | Evolution 2                  | EV20248012522   | 2022 |
| 2748   | Air Sampling Pump              | Pump                            | Gilian                  | 5000                         | 20220201001     | 2022 |
| 2754   | Rotary Agitator                | 12-place agitator w/AC motor    | Analytical Testing Corp | DC-20B                       | 585YEBC0008     | 2022 |
| 2756   | TurboVap                       | Evaporation System              | Biotage                 | TurboVap II                  | 212902440       | 2022 |
| 2757   | Hotblock                       | Digestion System                | Environmental Express   | SC154 (150)                  | 2022CECW5697    | 2022 |
| 2771   | Leak Detector                  | Leak Detector                   | Restek                  | 28500                        | 114117          | 2022 |
| 2772   | TKN Block Digestor             | BD50 Block                      | SEAL Analytical         | BD50                         | 5146U01576      | 2022 |
| 2773   | TKN Block Digestor Controller  | BD50/28 Programmable Controller | SEAL Analytical         | N/A                          | 5146U01575      | 2022 |
| 2776   | BOD Probe                      | BOD Probe                       | YSI                     | 626400                       | 21J101932       | 2022 |
| 2790   | BOD Meter                      | DO Meter                        | YSI                     | ProSolo 626650               | 22C103798       | 2022 |
| 2793   | pH probe                       | ROSS Ultra pH Electrode         | Thermo Scientific       | 8302BNUMD                    | AX1-15606       | 2022 |
| 2795   | Sonicator                      | Ultrasonic Cleaner              | Cole-Parmer             | 8892R-DTH                    | QCC 97025417D   | 2022 |
| 2796   | Oven                           | Drying for TS                   | Quincy Lab Inc.         | 40GC                         | G4-011511       | 2022 |
| 2804   | GC-21                          | 8890 GC                         | Agilent Technologies    | 8890 (G3540A)                | CN2105A062      | 2022 |
| 2805   | AS for GC-21                   | 150 vials tray                  | Agilent Technologies    | 7693 (G4514A)                | CN11090043      | 2022 |
| 2806   | Injector for GC-21             | Autoinjector                    | Agilent Technologies    | 7693A (G4513AR)              | CN12090142      | 2022 |

| ID No.               | Instrument                                | Type                                                               | Manufacturer                                 | Model                             | Serial Number                | Age                  |
|----------------------|-------------------------------------------|--------------------------------------------------------------------|----------------------------------------------|-----------------------------------|------------------------------|----------------------|
| 2807                 | Analytical Balance                        | Analytical Balance<br>0.0001gx120g                                 | Torbal                                       | AGCN120                           | 301201217                    | 2022                 |
| 2808                 | MiniRae Lite+PID                          | PID                                                                | Honeywell                                    | MiniRae Lite+<br>PGM 7300         | 590-911302                   | 2021                 |
| 2810                 | pH probe                                  | ROSS Ultra pH<br>Electrode                                         | Thermo Scientific                            | 8302BNUMD                         | AX1-15591                    | 2022                 |
| 2813                 | Conductivity Probe                        | 4-Electrode Cell                                                   | ThermoFisher                                 | THERMO013005MD                    | AT1-20371                    | 2022                 |
| 2817                 | pH probe                                  | Combination pH                                                     | Thermo Scientific                            | Orion 9104BNWP                    | AW1-16426                    | 2022                 |
| 2818                 | HPLC Pump                                 | Pump                                                               | Agilent                                      | G1311A                            | DE62957488                   | 2022                 |
| 2819                 | Conductivity Probe                        | MT-1 Probe                                                         | Mantech                                      | PCE-96-CT1010                     | K10/5MM/141                  | 2022                 |
| 2820                 | Probe 3                                   | Optical DO Probe - 3                                               | YSI                                          | ProOBOD Probe<br>#626400          | 21D100775                    | 2022                 |
| 2821                 | Autoclave                                 | Sterilizer                                                         | Market Forge                                 | STM-EL                            | 76369                        | 2015                 |
| 2826                 | MS-10 AS Tray                             | Autosampler Tray                                                   | Agilent                                      | 7683B, G2614A                     | CN31626009                   | 2022                 |
| 2828                 | Analytical Balance                        | Analytical Balance<br>0.0001gx120g                                 | Torbal                                       | AGCN220                           | 302201254                    | 2022                 |
| 2833                 | MiniRAE 3000+PID                          | PID                                                                | Honeywell                                    | MiniRAE 3000                      | 592-602783                   | 2022                 |
| 2817                 | pH probe                                  | Combination pH                                                     | Thermo Scientific                            | Orion 9104BNWP                    | AW1-16426                    | 2022                 |
| 2818                 | HPLC Pump                                 | Pump                                                               | Agilent                                      | G1311A                            | DE62957488                   | 2022                 |
| 2819                 | Conductivity Probe                        | MT-1 Probe                                                         | Mantech                                      | PCE-96-CT1010                     | K10/5MM/141                  | 2022                 |
| 2820                 | Probe 3                                   | Optical DO Probe - 3                                               | YSI                                          | ProOBOD Probe<br>#626400          | 21D100775                    | 2022                 |
| 2821                 | Autoclave                                 | Sterilizer                                                         | Market Forge                                 | STM-EL                            | 76369                        | 2015                 |
| 2826                 | MS-10 AS Tray                             | Autosampler Tray                                                   | Agilent                                      | 7683B, G2614A                     | CN31626009                   | 2022                 |
| 2828                 | Analytical Balance                        | Analytical Balance<br>0.0001gx120g                                 | Torbal                                       | AGCN220                           | 302201254                    | 2022                 |
| 2833                 | MiniRAE 3000+PID                          | PID                                                                | Honeywell                                    | MiniRAE 3000                      | 592-602783                   | 2022                 |
| <a href="#">2838</a> | <a href="#">TurboVap</a>                  | <a href="#">Evaporation System</a>                                 | <a href="#">Biotage</a>                      | <a href="#">TurboVap II</a>       | <a href="#">222103043</a>    | <a href="#">2022</a> |
| <a href="#">2839</a> | <a href="#">FS 3700 Analyzer</a>          | <a href="#">Auto Analyzer</a>                                      | <a href="#">OI Analytical</a>                | <a href="#">3700</a>              | <a href="#">22E105406</a>    | <a href="#">2022</a> |
| <a href="#">2840</a> | <a href="#">Peristaltic Pump</a>          | <a href="#">Pump for FS 3700</a>                                   | <a href="#">Cole-Parmer, Ismatec</a>         | <a href="#">61010-1/ISM939E</a>   | <a href="#">N/A</a>          | <a href="#">2022</a> |
| <a href="#">2841</a> | <a href="#">3180 Autosampler</a>          | <a href="#">Autosampler for FS 3700</a>                            | <a href="#">OI Analytical</a>                | <a href="#">ASX-280</a>           | <a href="#">072224A280</a>   | <a href="#">2022</a> |
| <a href="#">2842</a> | <a href="#">Distillation Module</a>       | <a href="#">In-line Distillation-Phenol</a>                        | <a href="#">OI Analytical</a>                | <a href="#">A515000</a>           | <a href="#">N/A</a>          | <a href="#">2022</a> |
| <a href="#">2843</a> | <a href="#">Circulator</a>                | <a href="#">Chilled Water Circulator</a>                           | <a href="#">Caron Products</a>               | <a href="#">2050-1-1</a>          | <a href="#">2050-1-1-093</a> | <a href="#">2022</a> |
| <a href="#">2844</a> | <a href="#">Oven</a>                      | <a href="#">180L Ovn Grvty</a>                                     | <a href="#">Fisher</a>                       | <a href="#">151028874</a>         | <a href="#">43095254</a>     | <a href="#">2022</a> |
| <a href="#">2857</a> | <a href="#">Microwave Extractor</a>       | <a href="#">Ethos X</a>                                            | <a href="#">Milestone</a>                    | <a href="#">Ethos X</a>           | <a href="#">22116946</a>     | <a href="#">2023</a> |
| <a href="#">2858</a> | <a href="#">Analytical Balance</a>        | <a href="#">Analytical Balance<br/>0.0001gx120g</a>                | <a href="#">Torbal</a>                       | <a href="#">AGCN220</a>           | <a href="#">302201282</a>    | <a href="#">2023</a> |
| <a href="#">2863</a> | <a href="#">Micro Lab 600 Autodiluter</a> | <a href="#">Autodiluter</a>                                        | <a href="#">Hamilton &amp; OI Analytical</a> | <a href="#">ML 600 / 61502-01</a> | <a href="#">ML600BL17908</a> | <a href="#">2023</a> |
| <a href="#">2864</a> | <a href="#">FSA Autodiluter Valve</a>     | <a href="#">Valve</a>                                              | <a href="#">OI Analytical</a>                | <a href="#">EUH</a>               | <a href="#">EUA26842</a>     | <a href="#">2023</a> |
| <a href="#">2865</a> | <a href="#">COD Reactor</a>               | <a href="#">Digital Reactor Block</a>                              | <a href="#">HACH Company</a>                 | <a href="#">DRB 200</a>           | <a href="#">23010C0187</a>   | <a href="#">2023</a> |
| <a href="#">2866</a> | <a href="#">Fume Hood</a>                 | <a href="#">6' Fisher American Chemical Fume Hood w/ Dual Sash</a> | <a href="#">Fisher American</a>              | <a href="#">6-31-SWNXX-SS</a>     | <a href="#">002357031023</a> | <a href="#">2023</a> |
| <a href="#">2867</a> | <a href="#">pH Meter</a>                  | <a href="#">Orion Versa Star Pro (VSTAR)</a>                       | <a href="#">Thermo Scientific</a>            | <a href="#">VSTAR10</a>           | <a href="#">V20393</a>       | <a href="#">2023</a> |
| <a href="#">2869</a> | <a href="#">pH Meter</a>                  | <a href="#">Orion Versa Star Pro (VSTAR)</a>                       | <a href="#">Thermo Scientific</a>            | <a href="#">VSTAR10</a>           | <a href="#">V20344</a>       | <a href="#">2023</a> |
| <a href="#">2870</a> | <a href="#">pH Probe</a>                  | <a href="#">ROSS Ultra pH Electrode</a>                            | <a href="#">Thermo Scientific</a>            | <a href="#">8302BNUMD</a>         | <a href="#">AP1-16325</a>    | <a href="#">2023</a> |
| <a href="#">2871</a> | <a href="#">pH Probe</a>                  | <a href="#">ROSS Ultra pH Electrode</a>                            | <a href="#">Mantech</a>                      | <a href="#">PCE-80-PH1200D</a>    | <a href="#">9195</a>         | <a href="#">2023</a> |
| <a href="#">2874</a> | <a href="#">pH Probe</a>                  | <a href="#">ROSS Ultra pH</a>                                      | <a href="#">Thermo Scientific</a>            | <a href="#">8302BNUMD</a>         | <a href="#">BY1-17167</a>    | <a href="#">2023</a> |

[illegible]

## APPENDIX IV - Chain of Custody



## Environment Testing

Eurofins Environment Testing Southeast-Atlanta, LLC  
3080 Presidential Drive, Atlanta, GA 30340 Phone: (770) 457-8177

## CHAIN OF CUSTODY

Work Order: \_\_\_\_\_  
Page \_\_\_\_\_ of \_\_\_\_\_

| COMPANY:    |           | ADDRESS:   |      | ANALYSIS REQUESTED |           |                       |                          |  |  |  |  |  |  |  |  | Visit our website<br>www.EurofinsUS.com for<br>downloadable COCs. |  | Number of Containers |  |
|-------------|-----------|------------|------|--------------------|-----------|-----------------------|--------------------------|--|--|--|--|--|--|--|--|-------------------------------------------------------------------|--|----------------------|--|
| PHONE:      |           | EMAIL:     |      |                    |           |                       |                          |  |  |  |  |  |  |  |  | REMARKS                                                           |  |                      |  |
| SAMPLED BY: |           | SIGNATURE: |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| #           | SAMPLE ID | SAMPLED:   |      | GRAB               | COMPOSITE | MATRIX<br>(see codes) | PRESERVATION (see codes) |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
|             |           | DATE       | TIME |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 1           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 2           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 3           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 4           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 5           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 6           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 7           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 8           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 9           |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 10          |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 11          |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 12          |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 13          |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |
| 14          |           |            |      |                    |           |                       |                          |  |  |  |  |  |  |  |  |                                                                   |  |                      |  |

| RELINQUISHED BY:               |  | DATE/TIME: |  | RECEIVED BY:                             |  | DATE/TIME: |  | PROJECT INFORMATION                   |  |  |  | RECEIPT                                                                                                                                                                                                                                                                                    |  |
|--------------------------------|--|------------|--|------------------------------------------|--|------------|--|---------------------------------------|--|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| 1.                             |  |            |  | 1.                                       |  |            |  | PROJECT NAME:                         |  |  |  | Total # of Containers                                                                                                                                                                                                                                                                      |  |
| 2.                             |  |            |  | 2.                                       |  |            |  | PROJECT #:                            |  |  |  | Turnaround Time (TAT) Request in Business Days                                                                                                                                                                                                                                             |  |
| 3.                             |  |            |  | 3.                                       |  |            |  | SITE ADDRESS:                         |  |  |  | <input type="checkbox"/> Standard <input type="checkbox"/> 4-Day Rush*<br><input type="checkbox"/> 3-Day Rush* <input type="checkbox"/> 2-Day Rush*<br><input type="checkbox"/> Next Day Rush* <input type="checkbox"/> Other _____<br><input type="checkbox"/> Same-Day Rush* (with req.) |  |
| SPECIAL INSTRUCTIONS/COMMENTS: |  |            |  | SHIPMENT METHOD                          |  |            |  | SEND REPORT TO:                       |  |  |  | * Surcharges apply for Rush TAT                                                                                                                                                                                                                                                            |  |
|                                |  |            |  | OUT: / /      VIA:                       |  |            |  | INVOICE TO (IF DIFFERENT FROM ABOVE): |  |  |  | REGULATORY PROGRAM (if any):                                                                                                                                                                                                                                                               |  |
|                                |  |            |  | IN: / /      VIA:                        |  |            |  |                                       |  |  |  | DATA PACKAGE: I <input type="radio"/> II <input type="radio"/> III <input type="radio"/> IV <input type="radio"/>                                                                                                                                                                          |  |
|                                |  |            |  | Client   FedEx   UPS   US mail   courier |  |            |  |                                       |  |  |  |                                                                                                                                                                                                                                                                                            |  |
|                                |  |            |  | other: _____                             |  |            |  | QUOTE #: _____      PO#: _____        |  |  |  |                                                                                                                                                                                                                                                                                            |  |

Submission of samples to the laboratory constitutes acceptance of EETSE's Terms & Conditions. Client assumes sole responsibility for damage or loss of samples before we accept them. Samples received after 3PM or on Saturday are considered as received the following business day. If no TAT is marked on COC, EETSE-Atlanta will proceed with standard TAT. Samples are disposed of 30 days after completion of report unless other arrangements are made.

Matrix Codes: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water ST = Stormwater WW = Waste Water W = Water (Blanks) DW = Drinking Water (Blanks) O = Other (specify)

Preservative Codes: H+I = Hydrochloric acid + ice I = Ice only N = Nitric acid S+I = Sulfuric acid + ice S/M+I = Sodium Bisulfate/Methanol + ice NaOH=SH O = Other (specify) NA = None

2.27.24 COC

## APPENDIX V

### QUALITY ASSURANCE MANUAL TRAINING SUMMARY (FORM 1)

Quality Assurance Manual Date and Revision Number:

Revision 30; March 27, 2024

Initial each section as reviewed. Please complete and return this form to Technical Director for placement in Employee's Training File:

- \_\_\_\_\_ Section 3.0, Statement of Policy
- \_\_\_\_\_ Section 4.0, Organization
- \_\_\_\_\_ Section 5.0, Quality Assurance Program
- \_\_\_\_\_ Section 6.0, Sample Bottle Preparation
- \_\_\_\_\_ Section 7.0, Custody of Samples, Equipment and Supplies
- \_\_\_\_\_ Section 8.0, Analytical Procedures
- \_\_\_\_\_ Section 9.0, Calibration Procedures and Frequency
- \_\_\_\_\_ Section 10.0, Preventative Maintenance
- \_\_\_\_\_ Section 11.0, Quality Control Checks & Routines to Assess Precision, Accuracy & MDLs
- \_\_\_\_\_ Section 12.0, Data Reduction, Review and Reporting
- \_\_\_\_\_ Section 13.0, Corrective Action and Nonconformances
- \_\_\_\_\_ Section 14.0, Performance and System Audits
- \_\_\_\_\_ Section 15.0, Quality Assurance Reports to Management
- \_\_\_\_\_ Section 16.0, Reagent Storage and Documentation
- \_\_\_\_\_ Section 17.0, Waste Disposal
- \_\_\_\_\_ Appendix I, Waste Disposal Procedures
- \_\_\_\_\_ Appendix II, Lab Equipment Preventive Maintenance Schedule
- \_\_\_\_\_ Appendix III, Lab Equipment List
- \_\_\_\_\_ Appendix VI, Corrective Action Form
- \_\_\_\_\_ Appendix VIII, List of all methods under which lab is Accredited
- \_\_\_\_\_ Appendix X (Outside Reference Documents)

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Print Name: \_\_\_\_\_ Date: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Supervisor: \_\_\_\_\_ Date: \_\_\_\_\_

Technical Director: \_\_\_\_\_ Date: \_\_\_\_\_

Quality Assurance Manager: \_\_\_\_\_ Date: \_\_\_\_\_



## APPENDIX V

## QUALITY ASSURANCE MANUAL TRAINING SUMMARY NON-TECHNICAL (FORM 2)

Quality Assurance Manual Date and Revision Number:  
Revision 30; March 27, 2024

Initial each section as reviewed. Please complete and return this form to Technical Director for placement in Employee's Training File:

\_\_\_\_\_ Section 3.0, Statement of Policy  
\_\_\_\_\_ Section 4.0, Organization  
\_\_\_\_\_ Section 5.0, Quality Assurance Program  
\_\_\_\_\_ Section 6.0, Sample Bottle Preparation  
\_\_\_\_\_ Section 7.0, Custody of Samples, Equipment and Supplies  
\_\_\_\_\_ Section 13.0, Corrective Action and Nonconformances  
\_\_\_\_\_ Section 14.0, Performance and System Audits  
\_\_\_\_\_ Section 16.0, Reagent Storage and Documentation  
\_\_\_\_\_ Section 17.0, Waste Disposal  
\_\_\_\_\_ Appendix I, Waste Disposal Procedures  
\_\_\_\_\_ Appendix VI, Corrective Action Form  
\_\_\_\_\_ Appendix VIII, List of all methods under which lab is Accredited

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Print Name: \_\_\_\_\_ Date: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Supervisor: \_\_\_\_\_ Date: \_\_\_\_\_

Technical Director: \_\_\_\_\_ Date: \_\_\_\_\_

Quality Assurance Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## APPENDIX VI - CORRECTIVE ACTION FORM

**Eurofins Atlanta**  
**Corrective Action Report**

Date Initiated: \_\_\_\_\_ Corrective Action Report ID: \_\_\_\_\_  
Initiated By: \_\_\_\_\_ Department: \_\_\_\_\_

**Corrective Action Description**

CAR Summary: \_\_\_\_\_

Description of Nonconformance: \_\_\_\_\_

Description of Corrective Action: \_\_\_\_\_

Performed By: \_\_\_\_\_ Completion Date: \_\_\_\_\_

**Client Notification**

Client Notification Required: \_\_\_\_\_ Notified By: \_\_\_\_\_

Comment: \_\_\_\_\_

**Quality Assurance Review**

Nonconformance Type: \_\_\_\_\_

Further Action required by QA: \_\_\_\_\_

**Approval and Closure**

Technical Director / Deputy Tech. Dir.: \_\_\_\_\_ Close Date: \_\_\_\_\_

QA Officer Approval: \_\_\_\_\_ QA Date: \_\_\_\_\_



Environment Testing

Clear Save as

**SAMPLE/COOLER RECEIPT CHECKLIST**

1. Client Name: \_\_\_\_\_ Work Order Number: **2403**

2. Carrier: FedEx ☐ UPS ☐ USPS ☐ Client ☐ Courier ☐ Other \_\_\_\_\_

|                                                                                            | Yes                   | No                    | N/A                   | Details                                                                                          | Comments |
|--------------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------------------|--------------------------------------------------------------------------------------------------|----------|
| 3. Shipping container/cooler received in good condition?                                   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | damaged <input type="checkbox"/> leaking <input type="checkbox"/> other <input type="checkbox"/> |          |
| 4. Custody seals present on shipping container?                                            | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                  |          |
| 5. Custody seals intact on shipping container?                                             | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                  |          |
| 6. Cooler temperature(s) within limits of 0-6°C? [See item 12 for temperature recordings.] | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                  |          |
| 7. Chain of Custody (COC) present?                                                         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                  |          |
| 8. Chain of Custody signed, dated, and timed when relinquished and received?               | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                  |          |
| 9. Sampler name and/or signature on COC?                                                   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                  |          |
| 10. Were all samples received within holding time?                                         | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                  |          |
| 11. TAT marked on the COC?                                                                 | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | If no TAT indicated, proceeded with standard TAT per Terms & Conditions.                         |          |

12. Cooler 1 Temperature \_\_\_\_\_ °C Cooler 2 Temperature \_\_\_\_\_ °C Cooler 3 Temperature \_\_\_\_\_ °C Cooler 4 Temperature \_\_\_\_\_ °C  
Cooler 5 Temperature \_\_\_\_\_ °C Cooler 6 Temperature \_\_\_\_\_ °C Cooler 7 Temperature \_\_\_\_\_ °C Cooler 8 Temperature \_\_\_\_\_ °C

13. Comments: \_\_\_\_\_

I certify that I have completed sections 1-13 (dated initials). \_\_\_\_\_

|                                                                     | Yes                   | No                    | N/A                   | Details                                                                                                                                      | Comments |
|---------------------------------------------------------------------|-----------------------|-----------------------|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 14. Temperature blanks present?                                     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 15. Were sample containers intact upon receipt?                     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 16. Custody seals present on sample containers?                     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 17. Custody seals intact on sample containers?                      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 18. Do sample container labels match the COC?                       | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | incomplete info <input type="checkbox"/> illegible <input type="checkbox"/> no label <input type="checkbox"/> other <input type="checkbox"/> |          |
| 19. Are analyses requested indicated on the COC?                    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 20. Were all of the samples listed on the COC received?             | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | samples received but not listed on COC <input type="checkbox"/> samples listed on COC not received <input type="checkbox"/>                  |          |
| 21. Was the sample collection date/time noted?                      | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 22. Did we receive sufficient sample volume for indicated analyses? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 23. Were samples received in appropriate containers?                | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 24. Were VOA samples received without headspace (< 1/4" bubble)?    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |                                                                                                                                              |          |
| 25. Were trip blanks submitted?                                     | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | listed on COC <input type="checkbox"/> not listed on COC <input type="checkbox"/>                                                            |          |

26. Comments: \_\_\_\_\_

I certify that I have completed sections 14-26 (dated initials). \_\_\_\_\_

**This section only applies to samples where pH can be checked at Sample Receipt.**

|                                                                 | Yes                   | No                    | N/A                   | Details | Comments |
|-----------------------------------------------------------------|-----------------------|-----------------------|-----------------------|---------|----------|
| 27. Have containers needing chemical preservation been checked? | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |         |          |
| 28. Containers meet preservation guidelines?                    | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |         |          |
| 29. Was pH adjusted at Sample Receipt?                          | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |         |          |

**\*Note:** Certain analyses require chemical preservation but must be checked in the laboratory and not upon Sample Receipt such as Coliforms, VOCs and Oil & Grease/TPH. This also excludes metals by EPA 200.7, 200.8 and 245.1 which will be verified between 16 and 24 hours after preservation.

I certify that I have completed sections 27-29 (dated initials). \_\_\_\_\_

Checklist 7.24.23 Rev 4

**Lock Checklist**

## APPENDIX VIII - List of all methods for which lab is Accredited

| Potable or Drinking Water (Safe Drinking Water Act - SDWA) |              |           |                 |
|------------------------------------------------------------|--------------|-----------|-----------------|
| Matrix                                                     | Category     | Method    | Description     |
| PW                                                         | Microbiology | SM9223B   | Total Coliforms |
| PW                                                         | Microbiology | SM9221D   | E. coli         |
| PW                                                         | Metals       | EPA 200.8 | Metals          |

| Non-Potable Water (Clean Water Act - CWA) |              |                         |                                    |
|-------------------------------------------|--------------|-------------------------|------------------------------------|
| Matrix                                    | Category     | Method                  | Description                        |
| NPW                                       | Microbiology | SM9222B                 | Total Coliforms                    |
| NPW                                       | Microbiology | SM9222D-2015            | Fecal Coliforms                    |
| NPW                                       | Microbiology | SM9223B-2016            | E. coli                            |
| NPW                                       | Gen Chem     | EPA 1010                | Ignitability                       |
| NPW                                       | Gen Chem     | EPA 120.1 and EPA 9050  | Conductivity                       |
| NPW                                       | Gen Chem     | EPA 160.4               | Residue-volatile                   |
| NPW                                       | Gen Chem     | EPA 1664B and EPA 9070  | Oil & Grease                       |
| NPW                                       | Gen Chem     | EPA 180.1               | Turbidity                          |
| NPW                                       | Gen Chem     | EPA 300.0               | Ion Scan                           |
| NPW                                       | Gen Chem     | EPA 350.1               | Ammonia as N                       |
| NPW                                       | Gen Chem     | EPA 351.2               | Kjeldahl nitrogen - total          |
| NPW                                       | Gen Chem     | NECi N07-0003           | Nitrogen, Nitrate-Nitrite (as N)   |
| NPW                                       | Gen Chem     | EPA 353.2               | Nitrate as N and Nitrate-nitrite   |
| NPW                                       | Gen Chem     | EPA 353.2               | Nitrite as N                       |
| NPW                                       | Gen Chem     | EPA 365.1               | Orthophosphate as P                |
| NPW                                       | Gen Chem     | EPA 365.1               | Phosphorus total                   |
| NPW                                       | Gen Chem     | EPA 410.4               | Chemical oxygen demand             |
| NPW                                       | Gen Chem     | EPA 420.1 and EPA 420.2 | Total phenolics                    |
| NPW                                       | Gen Chem     | EPA 7196A               | Chromium VI                        |
| NPW                                       | Gen Chem     | EPA 9010/9014           | Total cyanide                      |
| NPW                                       | Gen Chem     | EPA 9030/9034           | Sulfide                            |
| NPW                                       | Gen Chem     | EPA 9040                | pH                                 |
| NPW                                       | Gen Chem     | EPA 9056                | Ion Scan                           |
| NPW                                       | Gen Chem     | EPA 9060                | Total organic carbon               |
| NPW                                       | Gen Chem     | EPA 9065                | Total phenolics                    |
| NPW                                       | Gen Chem     | SM2310B-2011            | Acidity as CaCO <sub>3</sub>       |
| NPW                                       | Gen Chem     | SM10200H-2011           | Chlorophylls                       |
| NPW                                       | Gen Chem     | SM2120B-2011            | Color                              |
| NPW                                       | Gen Chem     | SM2120F-2011            | Color ADMI                         |
| NPW                                       | Gen Chem     | SM2320B-2011            | Alkalinity as CaCO <sub>3</sub>    |
| NPW                                       | Gen Chem     | SM2340B-2011            | Hardness                           |
| NPW                                       | Gen Chem     | SM2540B-2015            | Residue-total                      |
| NPW                                       | Gen Chem     | SM2540C-2015            | Residue-filterable (TDS)           |
| NPW                                       | Gen Chem     | SM2540D-2015            | Residue-nonfilterable (TSS)        |
| NPW                                       | Gen Chem     | SM2540E-2015            | Residue-Volatile                   |
| NPW                                       | Gen Chem     | SM2540E-2015            | Fixed Residue                      |
| NPW                                       | Gen Chem     | SM2540G-2015            | Total, fixed, and volatile residue |
| NPW                                       | Gen Chem     | SM2540F-2015            | Residue-settleable                 |
| NPW                                       | Gen Chem     | SM3500Cr B-2011         | Chromium VI                        |
| NPW                                       | Gen Chem     | SM3500-Fe B-2011        | Ferrous Iron                       |
| NPW                                       | Gen Chem     | SM4500ClG-2011          | Total residual chlorine            |

| Non-Potable Water (Clean Water Act - CWA) |               |                               |                                            |
|-------------------------------------------|---------------|-------------------------------|--------------------------------------------|
| Matrix                                    | Category      | Method                        | Description                                |
| NPW                                       | Gen Chem      | SM4500CN E-2016 Total Cyanide | Cyanide                                    |
| NPW                                       | Gen Chem      | SM4500CN G-2016               | Amenable cyanide                           |
| NPW                                       | Gen Chem      | SM4500H <sup>+</sup> B-2011   | pH                                         |
| NPW                                       | Gen Chem      | SM4500O H-2016                | Dissolved Oxygen                           |
| NPW                                       | Gen Chem      | SM4500S2 F-2011               | Sulfide                                    |
| NPW                                       | Gen Chem      | SM4500SO3 B-2011              | Sulfite-SO3                                |
| NPW                                       | Gen Chem      | SM5210B-2016                  | Biochemical oxygen demand (BOD)            |
| NPW                                       | Gen Chem      | SM5210B-2016                  | Carbonaceous BOD (CBOD)                    |
| NPW                                       | Gen Chem      | SM5310B TOC                   | Total organic carbon                       |
| NPW                                       | Gen Chem      | SM5540C MBAS Surfactants      | Surfactants - MBAS                         |
| NPW                                       | Gen Chem      | TKN - AMMONIA                 | Organic nitrogen                           |
| NPW                                       | Metals        | EPA 200.7 and EPA 6010        | Metals                                     |
| NPW                                       | Metals        | EPA 200.7                     | Total Phosphorus                           |
| NPW                                       | Metals        | EPA 6010                      | Total Phosphorus                           |
| NPW                                       | Metals        | EPA 200.8 and EPA 6020        | Metals                                     |
| NPW                                       | Metals        | EPA 245.1 and EPA 7470        | Mercury                                    |
| NPW                                       | Ext Organics  | EPA 8015                      | Diesel range organics (DRO)                |
| NPW                                       | Ext Organics  | FL-PRO                        | Total Petroleum Hydrocarbons (TPH)         |
| NPW                                       | Ext Organics  | EPA 610 and EPA 8310          | Polynuclear Aromatic Hydrocarbons (PAHs)   |
| NPW                                       | Ext Organics  | EPA 8315                      | Formaldehyde and Acetaldehyde              |
| NPW                                       | Ext Organics  | EPA 625.1 and EPA 8270        | Semi-Volatile (Base-Neutral-Acid) Organics |
| NPW                                       | Ext Organics  | RSK-175                       | GC Analysis of Gaseous Samples             |
| NPW                                       | Pest-Herb-PCB | EPA 8081                      | Pesticides                                 |
| NPW                                       | Pest-Herb-PCB | EPA 8082                      | Polychlorinated Biphenyls                  |
| NPW                                       | Pest-Herb-PCB | EPA 615 and EPA 8151          | Herbicides                                 |
| NPW                                       | Vol Organics  | EPA 8011                      | EDB & DBCP                                 |
| NPW                                       | Vol Organics  | EPA 8015                      | Gasoline range organics (GRO)              |
| NPW                                       | Vol Organics  | EPA 8015                      | Various Non-halogenated Volatile Compounds |
| NPW                                       | Vol Organics  | EPA 624.1 and EPA 8260        | Volatile Organics                          |

| Solids & Hazardous Materials (Resource Conservation & Recovery Act - RCRA) |          |                   |                           |
|----------------------------------------------------------------------------|----------|-------------------|---------------------------|
| Matrix                                                                     | Category | Method            | Description               |
| Solids                                                                     | Gen Chem | EPA 350.1 in Soil | Ammonia                   |
| Solids                                                                     | Gen Chem | EPA 351.2 in Soil | Kjeldahl nitrogen - total |
| Solids                                                                     | Gen Chem | EPA 365.1 in Soil | Total Phosphorus          |
| Solids                                                                     | Gen Chem | EPA 1010          | Ignitability              |
| Solids                                                                     | Gen Chem | EPA 1030          | Ignitability of Solids    |
| Solids                                                                     | Gen Chem | EPA 1311          | TCLP                      |
| Solids                                                                     | Gen Chem | EPA 1312          | SPLP                      |
| Solids                                                                     | Gen Chem | EPA 7196          | Chromium VI               |
| Solids                                                                     | Gen Chem | EPA 9010/9014     | Total cyanide             |
| Solids                                                                     | Gen Chem | EPA 9030/9034     | Sulfide                   |
| Solids                                                                     | Gen Chem | EPA 9040          | pH                        |
| Solids                                                                     | Gen Chem | EPA 9045          | pH                        |
| Solids                                                                     | Gen Chem | EPA 9050          | Conductivity              |
| Solids                                                                     | Gen Chem | EPA 9056          | Ion Scan                  |
| Solids                                                                     | Gen Chem | EPA 9060          | Total organic carbon      |
| Solids                                                                     | Gen Chem | EPA 9065          | Total phenolics           |

|        |          |          |              |
|--------|----------|----------|--------------|
| Solids | Gen Chem | EPA 9071 | Oil & Grease |
|--------|----------|----------|--------------|

| Solids & Hazardous Materials (Resource Conservation & Recovery Act - RCRA) |               |                 |                                            |
|----------------------------------------------------------------------------|---------------|-----------------|--------------------------------------------|
| Matrix                                                                     | Category      | Method          | Description                                |
| Solids                                                                     | Gen Chem      | EPA 9095        | Paint Filter Liquids Test                  |
| Solids                                                                     | Gen Chem      | Sec. 7.3 SW-846 | Reactive cyanide                           |
| Solids                                                                     | Gen Chem      | Sec. 7.3 SW-846 | Reactive sulfide                           |
| Solids                                                                     | Metals        | EPA 6010        | Metals                                     |
| Solids                                                                     | Metals        | EPA 6020        | Metals                                     |
| Solids                                                                     | Metals        | EPA 7471        | Mercury                                    |
| Solids                                                                     | Metals        | EPA 7473        | Mercury                                    |
| Solids                                                                     | Ext Organics  | EPA 8015        | Diesel range organics (DRO)                |
| Solids                                                                     | Ext Organics  | FL-PRO          | Total Petroleum Hydrocarbons (TPH)         |
| Solids                                                                     | Ext Organics  | EPA 8310        | Polynuclear Aromatic Hydrocarbons (PAHs)   |
| Solids                                                                     | Ext Organics  | EPA 8315        | Formaldehyde                               |
| Solids                                                                     | Ext Organics  | EPA 8270        | Semi-Volatile (Base-Neutral-Acid) Organics |
| Solids                                                                     | Pest-Herb-PCB | EPA 8081        | Pesticides                                 |
| Solids                                                                     | Pest-Herb-PCB | EPA 8082        | Polychlorinated Biphenyls                  |
| Solids                                                                     | Pest-Herb-PCB | EPA 8151        | Herbicides                                 |
| Solids                                                                     | Vol Organics  | EPA 8015        | Gasoline range organics (GRO)              |
| Solids                                                                     | Vol Organics  | EPA 8015        | Various Non-halogenated Volatile Compounds |
| Solids                                                                     | Vol Organics  | EPA 8260        | Volatile Organics                          |

| Matrix          | Category     | Method     | Description       |
|-----------------|--------------|------------|-------------------|
| Air & Emissions |              |            |                   |
| Air             | Vol Organics | EPA TO-14A | Volatile Organics |
| Air             | Vol Organics | EPA TO-15  | Volatile Organics |

| AIHA LAP Methods |              |                            |                                    |
|------------------|--------------|----------------------------|------------------------------------|
| Matrix           | Category     | Method                     | Description                        |
| Air              | Metals       | NIOSH 7300M/7303           | Elements by ICP                    |
| Solids           | Metals       | NIOSH 7082                 | Lead in Paint                      |
| Solids           | Metals       | SW3050B/7000B              | Total Lead in Solids               |
| Air              | Metals       | NIOSH 7082                 | Lead on Wipes                      |
| Air              | Asbestos     | NIOSH 7400                 | PCM                                |
| Air              | Microbiology | Fungal Air Direct Exam     | MB - 15019, MB - 15022, MB - 15028 |
| Air              | Microbiology | Fungal Bulk Direct Exam    | MB - 15020                         |
| Air              | Microbiology | Fungal Surface Direct Exam | MB - 15020                         |



## Quality Assurance Manual Acceptance Agreement

The information in this Quality Assurance Manual including its tables, appendices, figures, and / or attachments may be legally privileged and is confidential information intended for the use of reviewing Eurofins Environment Testing Southeast, LLC., Atlanta Quality System policies and procedures. You are hereby notified that any dissemination, distribution, or copy of this manual or information therein including tables, appendices, figures, and / or attachments is strictly prohibited without written permission from a representative of Eurofins Environment Testing Southeast, LLC, Atlanta Customer Service Department. If you have received this manual in error, please notify Eurofins Environment Testing Southeast, LLC, Atlanta Customer Service by telephone at (770) 457-8177 for instructions on returning the document. If an electronic copy has been received in error by email, contact Eurofins Environment Testing Southeast, LLC, Atlanta Customer Service Department and delete the message. Thank you.

SOP No. QA-01000

Date Revised  
March 27, 2024

Revision No.  
30

I have read, understood and agree to comply with the above statement.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Company

\_\_\_\_\_  
Phone Number with extension

## New Employee Initial Quality Assurance Manual Training

TRAINING: Initial Training on EETSE Atlanta SOP No. QA-01000,  
“SOP for the Quality Assurance Manual”

My signature confirms that I attended the initial training of the company’s Quality Assurance Manual, which includes a discussion of the various sections contained within as well as responsibilities I have while performing my daily duties. I will be reading various sections of that document according to my job function. Upon completion I will sign-off on form ‘[Appendix V](#) – Quality Assurance Manual Training Summary’.

Supervisor: \_\_\_\_\_

Section/area: \_\_\_\_\_

Print Name: \_\_\_\_\_

Employee Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## APPENDIX IX - Training Form 2

## Employee SOP / QA Manual Training &amp; Retraining Form

SOP and/or Training Description: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

My signature confirms that I was explained the reasons for this training/retraining and I have read/reviewed sections of the SOP, where applicable, along with other appropriate information including Interim Change Notices (ICNs), spreadsheets, logbook pages, sections in LIMS, calculations, and other forms as they apply. Further, I understand my responsibilities to follow the items presented in this training/retraining as they pertain to my job.

Supervisor: \_\_\_\_\_

Section/area: \_\_\_\_\_

Print Name: \_\_\_\_\_

Employee Signature: \_\_\_\_\_

Date: \_\_\_\_\_

QUALITY ASSURANCE MANUAL  
STANDARD OPERATING PROCEDURE ACKNOWLEDGEMENT

Name (Printed): \_\_\_\_\_

SOP Title: Quality Assurance ManualSOP Number: QA-01000 **Rev. No. 30**

The laboratory analyst signature on this approved SOP signifies the following: The analyst has read the SOP in its entirety and has read the analytical methods referenced in the SOP.

The analyst understands that the SOP is to be followed explicitly. Any deviation from the SOP must be noted in writing. Furthermore, the deviation from the SOP must be approved in writing by the laboratory supervisor and the QA staff prior to the analyst's adoption of the deviation from the SOP.

The controlled electronic of this SOP is located on the portal server at: Documents: Quality Assurance: QA Manuals: QA Manual: [2024\\_QA\\_Manual\\_Rev\\_30.pdf](#). If a hard copy is desired, you may request one from the Supervisor.

*Do not make a copy or print out the QA Manual yourself. Printed copies are uncontrolled documents.*

Print Name: \_\_\_\_\_

Date: \_\_\_\_\_

Analyst's Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Department Manager Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Technical Director's Signature: \_\_\_\_\_

Date: \_\_\_\_\_

## APPENDIX XI

### Outside Reference Documents

The company's list of Outside Reference Documents is now identified as our Document Registry Excel file available on our company portal: \\192.0.0.190\12\Technical\_Mng2\Procedures\Registry.

## APPENDIX XII

### Environmental Microbiology Laboratory Accreditation Program (EMLAP) Specific Requirements

#### 1.0 INTRODUCTION

Eurofins Environment Testing Southeast, LLC., Atlanta (EETSE Atlanta) is dedicated to providing quality analytical services. EETSE Atlanta specializes in the analysis of microorganisms commonly detected in air (e.g., spore trapping), surface (e.g., tape lifts, swabs, wipes), and bulk (e.g., wallboard, carpet, building materials) samples collected from schools, hospitals, offices, industrial, agricultural, and other work environments. EETSE Atlanta has implemented a quality assurance and quality control (QA/QC) program to establish quality control standards necessary for compliance to guidelines by The American Industrial Hygiene Association's Laboratory Accreditation Program (AIHA LAP) Environmental Microbiology Laboratory Accreditation Program (EMLAP). In order to consistently maintain high standards of precision and accuracy in analytical testing, EETSE Atlanta participates in AIHA LAP's Proficiency Analytical Testing (PAT) program.

This quality assurance plan will establish the procedures that will be followed to ensure accuracy, precision, completeness, and representation of data obtained from the analysis of environmental microbiology samples.

#### 2.0 PURPOSE

EETSE Atlanta has implemented a quality assurance, quality control program for the purpose of providing a baseline of standards which will allow for a continuous surveillance quality performance for the benefit of AIHA LAP EMLAP compliance, client satisfaction, and minimization of liability.

#### 3.0 SCOPE

This QA/QC program provides the necessary guidelines to secure and maintain:

- High level of quality work
- Comprehensive accountability of all activities relevant to laboratory services.
- Continuous compliance with ISO/IEC 17025 and AIHA LAP's EMLAP quality requirements.

This QA/QC program includes the following information:

- Comprehensive system of daily, weekly, monthly, and annual record keeping.
- Definition of routine monitoring activities.
- Sampling techniques for air, surface, and bulk collection.
- Sampling Equipment
- Calibration of Sampling Equipment
- Analysis of Air, Surface, and Bulk samples.
- Analytical Equipment

- Calibration of Analytical Equipment
- In-House training of analysts.
- QA/QC activities within lab.

#### 4.0 FACILITIES

The laboratory has adequate facilities for the scope of services and meets the requirements for the most current and relative biosafety guidelines set forth by CDC, WHO, and AIHA LAP. The lab has a documented routine monitoring program for the verification of adequate contamination control. The laboratory has the proper facilities for biological and chemical storage and disposal of refuse.

#### 5.0 EQUIPMENT

##### Microscope/Magnification System

- Microscope/Magnification System consisting of Compound optical microscope with a high magnification (100x) oil immersion objective having a numerical aperture (n.a.) of at least 1.25.
- Alignment of each microscope shall be documented with each day of use.
- Each microscope shall have an ocular micrometer that shall be checked annually with a NIST traceable stage micrometer.
- Field of View Diameter for each objective on the microscope shall be checked annually.

##### Class II Biological Safety Cabinet

- Performance certified annually according to NSF Standard 49.

##### Steam Sterilizer/Autoclave

- An autoclave with functioning temperature and pressure gauges for the disposal of potentially viable waste.
- Routine use of indicators to document successful sterilization with each use.
- Routine use of biological indicators to document the sterilization process.

##### Incubators and Refrigerators

- Temperature settings appropriate for the scope of testing.
- Temperatures recorded twice daily.

#### 6.0 PERSONNEL

The laboratory conforms to the personnel requirements of the AIHA LAP EMLAP guidelines. In all cases training records for degreed laboratory staff shall include a copy of transcript or diploma from an accredited college/university.

##### Technical Manager

- The laboratory shall be under the overall direction of an onsite, qualified person, who for the purposes of this document, is designated as the Technical Manager, and has the responsibility for the function, administration, and day-to-day operation of the laboratory. The Technical Manager or designee shall serve as the approved signatory.
- The Technical Manager shall have an earned microbiology or life science degree, minimally at the baccalaureate level, with the required combination of semester hours in microbiology and/or non-academic work experience as listed below. All non-academic work experience and coursework must be documented in the employee's training and personnel files.



- (a) Microbiology degree and a minimum of two (2) years of full time equivalent documented environmental microbiological work experience (bacteriology and/or mycology).
- (b) Life Science degree and:
- i. Twenty (20) semester hours in Microbiology and a minimum two (2) years of full time equivalent documented environmental microbiological work experience (bacteriology and/or mycology).
  - ii. Sixteen (16) semester hours in Microbiology and a minimum three (3) years of full time equivalent documented environmental microbiological work experience (bacteriology and/or mycology).
  - iii. Twelve (12) semester hours in Microbiology and a minimum four (4) years of full time equivalent documented environmental microbiological work experience (bacteriology and/or mycology).
  - iv. Eight (8) semester hours in microbiology and a minimum of five (5) years of full time equivalent documented environmental microbiological experience (bacteriology and/or mycology).
- (c) Experience must reflect the scope of work of the laboratory.
- The Technical Manager shall be experienced in the selection and the use of bioaerosol, surface, fluid, and raw material sampling methods and in sample processing for the quantification and identification appropriate to the FoTs of mesophilic and thermophilic bacteria, and mesophilic, xerophilic, thermo tolerant fungi (molds and yeasts), and fungi identified by spore trap collection methods.
  - Training records for the Technical Manager shall include documentation of ability to identify genus/group of fungi from spore trap analysis and genus/species of fungi that are reported.
- Laboratory Analytical Staff
- The environmental microbiological program distinguishes two titles for those conducting analytical procedures within the laboratory. An analyst is one who has a bachelor's degree and a technician is one who does not have a degree.
- Laboratory Technicians
- These staff members shall have a high school diploma or General Education Development (GED) During this required training period, the trainee shall perform work (and have work reviewed prior to release) under the direct supervision of a qualified technician, analyst and/or the Technical Manager.
  - Technicians may function in the same manner as analysts for Air – Direct Examination (spore trap) analysis after completion of six (6) months documented on the job training and demonstrated proficiency. For all other analyses, technicians may function in the same manner as analysts after one (1) year documented on the job training and demonstrated proficiency.

## Laboratory Analysts

- These staff members shall have a bachelor's degree in a physical or biological science. Analysts shall have three (3) months of documented training for Air - Direct Examination (spore trap) and six (6) months of documented on-the-job training functioning for all other analyses as an analyst trainee. During the required analyst training period, the trainee shall be under the direct supervision of another qualified analyst and/or the Technical Manager. During this period, the trainee shall have all work reviewed prior to release by another qualified analyst and/or the Technical Manager. Training records for technicians and analysts shall include documentation of ability to identify genus/species of fungi and genus/group of fungi that are reported. Bacterial identification training records shall document training of relevant diagnostic procedures (e.g., gram stain, oxidase, biochemical reactions).

- All analysts and technicians shall have demonstrated ability to produce reliable results through accurate analysis of certified reference materials (CRMs), proficiency testing samples or in-house quality control samples. This demonstration shall be performed and documented at a minimum of every six (6) months.
- Laboratory Quality Assurance Coordinator

- This Quality Assurance Coordinator (QAC) of the laboratory shall possess a bachelor's degree in an applicable basic or applied science and have six (6) months of non-academic relevant and documented microbiological laboratory analysis experience. In lieu of bachelor's degree, four years of non-academic analytical experience is acceptable.
- The QAC shall have training in statistics. Additional training may consist of quality control procedures.

## 7.0 ANALYTICAL METHODS: See SOP's

## 8.0 QUALITY ASSURANCE/QUALITY CONTROL

- Routine QA/QC procedures shall be an integral part of the laboratory procedures and functions. The laboratory is in compliance with APHA-AWWA-WPCF guidelines in *Standard Methods for the Examination of Water and Wastewater*, current edition, for microbiology laboratories.
- Five (5) percent intra-analyst analysis shall be completed by each analyst to assess the precision of the analyst.
- Five (5) percent inter-analyst analysis shall be completed to assess the accuracy of the analysis performed within the laboratory.
- The laboratory shall use control charts or databases to compare intra- and inter-analyst analysis performance to established control charts.
- The laboratory shall ensure the quality control of culture media and analytical reagents per lot number for appropriate sterility, microbial growth, and/or analytical reactions. Records will be maintained and acceptance criteria will be documented.
- Acceptance Criteria on 5% replicate and duplicate analysis, daily reference slide analysis (spore traps) and monthly reference culture analysis will be documented and shall include the following:
  - (a) Taxon identification acceptability
  - (b) Taxon abundance ranking acceptability

(c) Count of concentration acceptability determined statistically with use of control charts or databases (Spore Traps only).

- Laboratory will maintain routine records of temperature documentation for refrigerators and incubators. Acceptance criteria will be documented.
  - The laboratory maintains a microbial culture collection of common organisms relevant to the methods performed. Cultures will be from recognized sources including EMPAT rounds. The culture collection will include the source and date of acquisition.
  - The culture collection will be used monthly to prepare blind cultures to be used as part of the routine QC program to monitor accuracy in culture identification.
  - The laboratory has a reference slide collection with various count levels and genera/groups of spores which is maintained and used as part of total spore analysis quality control.
  - Each day of analysis, at least one slide from the collection shall be reviewed by each analyst. Slides are viewed on a rotational schedule so a different slide is viewed each day until the entire slide collection is examined. Analysis of these slides is incorporated into the daily QC plan. Acceptance criteria documented.
  - Statistically derived control charts with control limits are used to assess performance.
  - The laboratory participates and has documentation of a round robin slide exchange of real samples consistent with AIHA LAP Policy 6A.3.2 *Requirements for Round Robin Programs*.
  - Round robins include the participation of three (3) laboratories. Round robin program will consist of at least two (2) rounds per year, with each round completed within a 6-month timeframe.
  - Each round will consist of four (4) samples at varying concentrations.
  - Each analyst within the lab will analyze samples independently and each analyst's results will be reported.
  - The round robin data will include raw counts and final concentrations for each fungal structure observed.
  - Round Robin acceptance criteria shall include the organism identification, ranking, and quantification.
  - A designated laboratory shall be responsible for data collection and distribution. The participating laboratories shall rotate this designation.
  - A routine air monitoring program is used to verify adequate contamination control.
- (a) Two (2) spore trap samples are collected each month. One (1) inside sample and One (1) outside sample are collected and compared. Acceptance criteria will be documented.

#### SAFETY, HEALTH, ENVIRONMENTAL AND TRANSPORTATION REGULATIONS

EETSE Atlanta adheres to all applicable federal, state, and local regulations regarding safety, health, environment or transportation. Potentially viable microbial waste shall be collected in properly designated biohazard containers and disposed of properly through autoclaving.

## Attachment 4

### EUROFINS ENVIRONMENT TESTING SOUTHEAST, LLC. Atlanta ANNUAL MANAGEMENT REVIEW

#### REQUIRED PARTICIPANTS:

**Business Unit Manager (BUMa)**

QA Manager

PCM Manager

Sample Rec. Manager

Micro Bio Lab Manager

Volatiles Lab Manager

Wet Chem Lab Manager

PLM Manager

Filtration Manager

**Laboratory Manager**

Technical Director

Metals Lab Manager

Semi-Volatile Lab Manager

Customer Service Manager

IC Manager

TEM Manager

General Chemistry Manager

Volatile Air & Soil Manager

The review will be conducted by the BUMa with the assistance of the Quality Assurance Manager.

#### AGENDA

1. Follow Up-Actions from previous Management Review meetings.
  - a. Changes in Policy and Procedures (QA)
  - b. Facility Improvements (BUMa)
2. Quality Assurance Report:
  - a. Accreditation Requirements (QA)
  - b. Changes in Management Structure (Laboratory Manager)
  - c. Changes/Expansion of laboratory Services (BUMa)
  - d. New/Updates of Procedures/SOP's/Reference Materials (QA)
  - e. Outcomes to the Assurance of the Validity of Results from
    - i. Internal QC Samples; Certified or Second source Reference Materials
    - ii. Proficiency Tests
    - iii. Replicate Testing
    - iv. Correlation of Results for different sample tests (e.g. COD / BOD ratio)
  - f. Results of Risk Identification
3. Review of Performance in Quality Areas
  - a. Handling of failed QC Data: Each Department Supervisor provide an overall statement of finding these errors and how they are being handled in their department as they relate to the items listed. How the lab control listed affected Quality Control Performance if relative (e.g. Pipettor EETSE Atlanta 1234 was received in April. Quarterly checks were noticeably tighter than the +/-2% acceptance criteria listed on the sheet.)
    - i. General Quality Assurance (indicate ability of the equipment to meet verification frequency requirements)
      1. Balance Performance:
      2. Pipettor Performance:
      3. Hotblock Temperature Checks:

## Environment Testing

4. Thermometer Verifications:
5. Incubator Temperature Checks:
6. Annual QC Acceptance Limits Update:
7. Annual Reporting Limit Verification:
8. Annual MDL Studies (where applicable):
9. Other:

### ii. Metals:

1. Balance Performance:
2. Pipettor Performance:
3. Annual QC Acceptance Limits Update:
4. Annual Reporting Limit Verification:
5. Annual MDL Studies (where applicable):
6. Linear Calibration Range Studies:
7. Quarterly Pb Contamination Checks:
8. New Personnel:
9. Other (Annual vs. Quarterly IDL Check):

### iii. Metals Prep:

1. Balance Performance:
2. Pipettor Performance:
3. Hotblock Temperature Checks:
4. Annual Reporting Limit Verification:
5. Annual MDL Studies (where applicable):
6. New Personnel:
7. Other:

### iv. Wet Chemistry:

1. Equipment Performance
2. Hotblock Temperature Checks:
3. Pipettor Performance:
4. Balance Performance:
5. Annual QC Acceptance Limits Update:
6. Annual Reporting Limit Verification:
7. Annual MDL Studies (where applicable):
8. Linear Calibration Range Studies (EPA 180.1):
9. New Personnel:
10. Other (Such as ongoing comparison studies):

### v. IC:

1. Equipment Performance
2. Linear Range Calibration Study:
3. Hotblock Temperature Checks:
4. Pipettor Performance:
5. Balance Performance:
6. Annual QC Acceptance Limits Update (e.g. 365.1\_S):

## Environment Testing

7. Annual Reporting Limit Verification:
8. Annual MDL Studies (where applicable):
9. Linear Calibration Range Studies:
10. New Personnel:
11. Other:

### vi. Volatiles:

1. Equipment Performance
2. Balance Performance:
3. Annual QC Acceptance Limits Update:
4. Annual Reporting Limit Verification:
5. Annual MDL Studies (where applicable):
6. New Personnel:
7. Other (e.g. Quarterly GRO check):

### vii. Semi-Volatiles/Semi-Prep:

1. Equipment Performance
2. Balance Performance:
3. Annual QC Acceptance Limits Update:
4. Annual Reporting Limit Verification:
5. Annual MDL Studies (where applicable):
6. New Personnel:
7. Other:

### viii. Asbestos:

1. Microscope Performance
2. Balance Performance:
3. Microscope Alignment Calibration:
4. Monthly Air Contamination Checks:
5. New Personnel:
6. Other:

### ix. Microbiology:

1. Microscope Performance
2. Balance Performance:
3. Microscope Alignment Calibration:
4. Monthly Air Contamination Checks:
5. New Personnel:
6. Other:

### x. General Chemistry Manager

1. Equipment Performance
2. Balance Performance:
3. Annual QC Acceptance Limits Update:
4. Annual Reporting Limit Verification:
5. Annual MDL Studies (where applicable):
6. New Personnel:



7. Other:

xi. Filtration Manager

1. Equipment Performance
2. Balance Performance:
3. Annual QC Acceptance Limits Update:
4. Annual Reporting Limit Verification:
5. Annual MDL Studies (where applicable):
6. New Personnel:
7. Other:

xii. Volatile Air & Soil Manager

1. Equipment Performance
2. Balance Performance:
3. Annual QC Acceptance Limits Update:
4. Annual Reporting Limit Verification:
5. Annual MDL Studies (where applicable):
6. New Personnel:
7. Other:

b. Major PT Failure issues (QA)

- c. Repeat and total number of deficiencies per department (Each Dept. Supervisor provide info. on repeat and total number of deficiencies related to a specific analysts or your dept. and how it is being handled, technical reprimands, etc.)

Metals:

Metals Prep:

Wet Chemistry:

IC:

Volatiles:

Semi-Volatiles:

Semi-Prep:

Asbestos:

Microbiology:

General Chemistry:

Filtration:

Volatile Air & Soil (VAS):

Sample Receiving:

4. Managerial Reports

- a. Equipment Needs (Each Dept. Supervisor to provide info. on current equip./staff needs)

Metals:

Metals Prep:

Wet Chemistry:

IC:

Volatiles:

Semi-Volatiles:

Semi-Prep:

Asbestos:

Microbiology:

General Chemistry:

Filtration:

Volatile Air & Soil (VAS):

Sample Receiving:

## b. Equipment Maintenance

- i. Calibration Information (Laboratory Manager)
- ii. Repair and maintenance data (Laboratory Manager)
- iii. Equipment downtime logs/review (Each Dept. Supervisor)

Metals:

Metals Prep:

Wet Chemistry:

IC:

Volatiles:

Semi-Volatiles:

Semi-Prep:

Asbestos:

Microbiology:

General Chemistry:

Filtration:

Volatile Air & Soil (VAS):

Sample Receiving:

## iv. Resources

1. Staffing Needs (Each Dept. Supervisor/Laboratory Manager)
2. Department Training Needs (QA-Technical Director)
3. Facility and Equipment Needs (BUMa/Laboratory Manager)

## 5. Internal Auditing

- a. Audit Results (QA)
- b. Audit Schedule (QA)
- c. Nonconformance by Department (HR)
- d. Results of Inter-Laboratory comparisons or proficiency (QA)

## 6. Corrective Actions

- a. Type and source of issues (Each dept. Supervisor)

Metals:

Metals Prep:

Wet Chemistry:

IC:

Volatiles:

Semi-Volatiles:

Semi-Prep:

Asbestos:

Microbiology:

General Chemistry:

Filtration:

Volatile Air & Soil (VAS):

Sample Receiving:

- b. Areas most commonly having problems (QA)
  - c. Trends of root causes (QA)
  - d. Reoccurring problems (QA)
  - e. Summary and review of corrective action log (QA)
7. External Audit
- a. Performance Evaluation for Quality System and Technical Aspects (QA)
  - b. Evaluation common weak areas from each auditing agency (QA)
8. Quality Planning
- a. Upcoming projects (Customer Service Manager)
  - b. Status of ongoing projects (Customer Service Manager)
  - c. Significant changes including staff/equipment/required accreditations (BUMa)
9. Customer Feedback (Customer Service Manager)
- a. Customer complaints
    - i. Review of Customer Complaint Corrective Action Logs
      - 1. Repeated complaints
      - 2. Related/Unrelated issues
      - 3. Cause of issues identified and corrective measures followed
      - 4. Weekly meeting review
  - b. Client satisfaction survey
10. Improvements (BUMa/Laboratory Manager)
- a. Review of Quality Policy/Objectives
  - b. Review of Quality Systems effectiveness and improvement of system and services

Detail and assign responsible party time line for implementation of task.

EUROFINS ENVIRONMENT TESTING SOUTHEAST, LLC. Atlanta  
ANNUAL MANAGEMENT REVIEW

My signature confirms that I participated in the Annual Management Review:

Name

## Position

Date

UNCONTROLLED COPY

## **Appendix E: Example Field Forms**



514 Hillcrest Industrial Boulevard  
Macon, Georgia 31204

**P** (478) 757-1606

**F** (478) 757-1608

**Terracon.com**

### DAILY ABATEMENT PROJECT REPORT

Project Name: \_\_\_\_\_ Date: \_\_\_\_\_

TERRACON Project Number: \_\_\_\_\_ Address: \_\_\_\_\_

#### WORKFORCE SIZE

| Contractor | Inside Containment | Outside Containment | Start | End | Hours |
|------------|--------------------|---------------------|-------|-----|-------|
|            |                    |                     |       |     |       |
|            |                    |                     |       |     |       |
|            |                    |                     |       |     |       |
|            |                    |                     |       |     |       |
|            |                    |                     |       |     |       |

#### VISITORS TO SITE

| Name | Company/Agency | In | Out | Comments |
|------|----------------|----|-----|----------|
|      | Terracon       |    |     |          |
|      | Terracon       |    |     |          |
|      |                |    |     |          |

#### WORK IN PROGRESS

|                           |                      |                    |
|---------------------------|----------------------|--------------------|
| ___ Work Area Preparation | ___ Surgical Removal | ___ Encapsulation  |
| ___ Mini-Containment      |                      |                    |
| ___ Waste Load Out        | ___ Cleaning         | ___ Final Cleaning |
| ___ Removal               | ___ Other:           | ___ Clearance      |





**DAILY ABATEMENT PROJECT REPORT**

Project Name: \_\_\_\_\_

Date: \_\_\_\_\_

Terracon Project Number: \_\_\_\_\_

Location: \_\_\_\_\_

Project Manager: \_\_\_\_\_

Signature: \_\_\_\_\_

Date: \_\_\_\_\_



Environment Testing

Eurofins Environment Testing Southeast-Atlanta, LLC

3080 Presidential Drive, Atlanta, GA 30340

Phone: (770) 457-8177 / Toll-Free: (800) 972-4889

[www.EurofinsUS.com](http://www.EurofinsUS.com)

Work Order: \_\_\_\_\_

Page \_\_\_\_ of \_\_\_\_

**CHAIN OF CUSTODY  
BULK ASBESTOS ANALYSIS**

|                   |       |                      |       |
|-------------------|-------|----------------------|-------|
| Client Name:      | _____ | Project Name:        | _____ |
| Address:          | _____ | Project Number:      | _____ |
| City, State, Zip: | _____ | Sampling Date:       | _____ |
| Contact:          | _____ | Phone #:             | _____ |
| Sampler's Name:   | _____ | Invoice To Name(s):  | _____ |
| Report To:        | _____ | Invoice To Email(s): | _____ |
| Report to Email:  | _____ | PO #:                | _____ |

|    | Sample ID | Sample Location/Description | Analysis Requested | Turnaround Time (TAT) | Comments |
|----|-----------|-----------------------------|--------------------|-----------------------|----------|
| 1  |           |                             |                    |                       |          |
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| Relinquished by: | _____ | Date/Time: | _____ |
| Received by:     | _____ | Date/Time: | _____ |
| Relinquished by: | _____ | Date/Time: | _____ |
| Received by:     | _____ | Date/Time: | _____ |

Submission of samples to the laboratory constitutes acceptance of EETSE's Terms & Conditions. Client assumes sole responsibility for damage or loss of samples before we accept them. Samples received after 3PM or on Saturday are considered as received the following business day. If no TAT is marked on COC, EETSE-Atlanta will proceed with standard TAT.

Asbestos COC2.28.24

FOR LAB USE ONLY

Lab Recipient: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Method of Shipment: \_\_\_\_\_



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3080 Presidential Drive, Atlanta, GA 30340

Phone: (770) 457-8177 / Toll-Free: (800) 972-4889

[www.EurofinsUS.com](http://www.EurofinsUS.com)

Work Order: \_\_\_\_\_

Page \_\_\_\_ of \_\_\_\_

**CHAIN OF CUSTODY  
BULK ASBESTOS ANALYSIS**

|                   |       |                      |       |
|-------------------|-------|----------------------|-------|
| Client Name:      | _____ | Project Name:        | _____ |
| Address:          | _____ | Project Number:      | _____ |
| City, State, Zip: | _____ | Sampling Date:       | _____ |
| Contact:          | _____ | Phone #:             | _____ |
| Sampler's Name:   | _____ | Invoice To Name(s):  | _____ |
| Report To:        | _____ | Invoice To Email(s): | _____ |
| Report to Email:  | _____ | PO #:                | _____ |

|    | Sample ID | Sample Location/Description | Analysis Requested | Turnaround Time (TAT) | Comments |
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| Relinquished by: | _____ | Date/Time: | _____ |
| Received by:     | _____ | Date/Time: | _____ |

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Asbestos COC2.28.24

FOR LAB USE ONLY

Lab Recipient: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Method of Shipment: \_\_\_\_\_



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Page \_\_\_\_ of \_\_\_\_

**CHAIN OF CUSTODY  
BULK ASBESTOS ANALYSIS**

|                   |       |                      |       |
|-------------------|-------|----------------------|-------|
| Client Name:      | _____ | Project Name:        | _____ |
| Address:          | _____ | Project Number:      | _____ |
| City, State, Zip: | _____ | Sampling Date:       | _____ |
| Contact:          | _____ | Phone #:             | _____ |
| Sampler's Name:   | _____ | Invoice To Name(s):  | _____ |
| Report To:        | _____ | Invoice To Email(s): | _____ |
| Report to Email:  | _____ | PO #:                | _____ |

|    | Sample ID | Sample Location/Description | Analysis Requested | Turnaround Time (TAT) | Comments |
|----|-----------|-----------------------------|--------------------|-----------------------|----------|
| 1  |           |                             |                    |                       |          |
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| Received by:     | _____ | Date/Time: | _____ |

Submission of samples to the laboratory constitutes acceptance of EETSE's Terms & Conditions. Client assumes sole responsibility for damage or loss of samples before we accept them. Samples received after 3PM or on Saturday are considered as received the following business day. If no TAT is marked on COC, EETSE-Atlanta will proceed with standard TAT.

Asbestos COC2.28.24

FOR LAB USE ONLY

Lab Recipient: \_\_\_\_\_ Date/Time: \_\_\_\_\_ Method of Shipment: \_\_\_\_\_



## CHAIN OF CUSTODY

Page \_\_\_\_ of \_\_\_\_

2.27.24\_COC



## CHAIN OF CUSTODY

Page      of

2.27.24\_COC





CHAIN OF CUSTODY

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------|------|-----------------|-----------|-----------------------------------------------------------------------------------|--------------------------|---------------------------------------|--|--|--|--|--|--|--|--|--|--|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------|
| COMPANY:                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           | ADDRESS:   |      |                 |           |                                                                                   | ANALYSIS REQUESTED       |                                       |  |  |  |  |  |  |  |  |  |  | Visit our website<br><b>www.EurofinsUS.com</b> for<br>downloadable COCs. |                                                                                                                   | Number of Containers |
| PHONE:                                                                                                                                                                                                                                                                                                                                                                                                                                                          |           | EMAIL:     |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| SAMPLED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                     |           | SIGNATURE: |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| #                                                                                                                                                                                                                                                                                                                                                                                                                                                               | SAMPLE ID | SAMPLED:   |      | GRAB            | COMPOSITE | MATRIX<br>(see codes)                                                             | PRESERVATION (see codes) |                                       |  |  |  |  |  |  |  |  |  |  | REMARKS                                                                  |                                                                                                                   |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           | DATE       | TIME |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
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| 3                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 7                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 8                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 9                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 10                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 11                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 12                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 13                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| 14                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |
| RELINQUISHED BY:                                                                                                                                                                                                                                                                                                                                                                                                                                                |           | DATE/TIME: |      | RECEIVED BY:    |           | DATE/TIME:                                                                        |                          | PROJECT INFORMATION                   |  |  |  |  |  |  |  |  |  |  |                                                                          | RECEIPT                                                                                                           |                      |
| 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      | 1.              |           |                                                                                   |                          | PROJECT NAME:                         |  |  |  |  |  |  |  |  |  |  |                                                                          | Total # of Containers                                                                                             |                      |
| 2.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      | 2.              |           |                                                                                   |                          | PROJECT #:                            |  |  |  |  |  |  |  |  |  |  |                                                                          | Turnaround Time (TAT) Request in Business Days                                                                    |                      |
| 3.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |            |      | 3.              |           |                                                                                   |                          | SITE ADDRESS:                         |  |  |  |  |  |  |  |  |  |  |                                                                          | <input type="checkbox"/> Standard <input type="checkbox"/> 4-Day Rush*                                            |                      |
| SPECIAL INSTRUCTIONS/COMMENTS:                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |            |      | SHIPMENT METHOD |           | OUT: / / VIA:<br>IN: / / VIA:<br>Client FedEx UPS US mail courier<br>other: _____ |                          | SEND REPORT TO:                       |  |  |  |  |  |  |  |  |  |  |                                                                          | <input type="checkbox"/> 3-Day Rush* <input type="checkbox"/> 2-Day Rush*                                         |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                 |           |                                                                                   |                          | INVOICE TO (IF DIFFERENT FROM ABOVE): |  |  |  |  |  |  |  |  |  |  |                                                                          | <input type="checkbox"/> Next Day Rush* <input type="checkbox"/> Other _____                                      |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                 |           |                                                                                   |                          | QUOTE #: _____ PO#: _____             |  |  |  |  |  |  |  |  |  |  |                                                                          | <input type="checkbox"/> Same-Day Rush* (auth req.)                                                               |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          | * Surcharges apply for Rush TAT                                                                                   |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          | REGULATORY PROGRAM (if any):                                                                                      |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          | DATA PACKAGE: I <input type="radio"/> II <input type="radio"/> III <input type="radio"/> IV <input type="radio"/> |                      |
| Submission of samples to the laboratory constitutes acceptance of EETSE's Terms & Conditions. Client assumes sole responsibility for damage or loss of samples before we accept them. Samples received after 3PM or on Saturday are considered as received the following business day. If no TAT is marked on COC, EETSE-Atlanta will proceed with standard TAT. Samples are disposed of 30 days after completion of report unless other arrangements are made. |           |            |      |                 |           |                                                                                   |                          |                                       |  |  |  |  |  |  |  |  |  |  |                                                                          |                                                                                                                   |                      |

## **Appendix F: Contractor's License**

**License To Conduct Regulated Asbestos Activities in Georgia  
Lead-Based Paint and Asbestos Program Certification, Accreditation, & Licensing Unit**

Jeffrey W. Cown, Director  
4244 International Parkway, Suite 104  
Atlanta, Georgia 30354

***HIBERNIA ENTERPRISES, INC.***

Having satisfied the requirements of The Georgia Asbestos Safety Act, O.C.G.A. 12-12-1, et seq and the Rules for Asbestos Removal and Encapsulation, Chapter 391-3-14, Is Hereby Licensed as an **ASBESTOS CONTRACTOR FIRM** To Remove and Encapsulate Friable Asbestos Containing Materials Within the State of Georgia. This Certificate May Be Subject To Revocation, Suspension, Modification Or Amendment By The Director For Cause Including Evidence Of Noncompliance; Or For Any Misrepresentation Made In The Application, Supporting Data Entered Therein Or Attached Thereto, Or Any Subsequent Submittals Or Supporting Data; Or Any Alterations Affecting The Ability To Perform Duties Properly.

**Company Owner/President**

**ROBERT HEAVEY**

**Company Mailing Address**

**3680 Hewatt Court**

**Snellville, GA 30039**

**Phone: 678-618-0461**

**Fax:**

**Company License Number**

**ASBRN-9820**

**Principal Agent's Name**

**ROBERT HEAVEY**

**Agent's Date of Birth**

**Agent's Height**

**Agent's Weight**

**08/11/1968**

**6'0"**

**175**

**The Company License and the Agent's Authorization are interconnected, and the issue and expiration dates run concurrently. The issue and expiration dates shown below apply to both the Company License and the Agent's Authorization. If the agent ceases his authorization to serve, a replacement agent must be submitted immediately for approval consideration.**

**ISSUE DATE**

**EXPIRATION DATE**

**8/15/2024**

**8/15/2027**

**Lead-Based Paint and Asbestos Program  
(404) 363-7026**

**ISSUED BY**

**Kate Betsill**



# GEORGIA

DEPARTMENT OF NATURAL RESOURCES

## ENVIRONMENTAL PROTECTION DIVISION

*Jeffrey W. Cown, Director*  
4244 International Parkway, Suite 104  
Atlanta, Georgia 30354

### ***Georgia Certified Renovation Firm License***

**GA-EPD-RRP FIRM-9820**

*This Is To Certify That*

## ***HIBERNIA ENTERPRISES INC***

3680 HEWATT COURT  
SNELLVILLE, GA 30039

**ROBERT HEAVEY**

*Owner/President*

*Having Satisfied the Requirements of The Georgia Lead Poisoning Prevention Act, O.C.G.A. 31-41-1, et seq and the Rules for Lead-Based Paint Hazard Management, Chapter 391-3-24, The Above Referenced Firm is Hereby Certified To Perform Lead-Based Paint Renovation Activities in the State of Georgia. This License May Be Subject to Revocation, Suspension, or Modification by the Director for Cause Including Evidence of Noncompliance or For Any Misrepresentation Made in the Application, Supporting Data or Subsequent Submittals Entered Therein or Attached Thereto, or Failed to Maintain Required Records. The Certification Holder Agrees to Use Only Georgia Certified and Trained Individuals When Conducting Georgia Regulated Lead-Based Paint Renovation Activities Covered By This License.*

| <i>Issue Date</i>                    | <i>Expiration Date</i> |
|--------------------------------------|------------------------|
| 8/13/2024                            | 9/16/2027              |
| <b>Firm ID: GA-EPD-RRP FIRM-9820</b> |                        |

***Lead-Based Paint and Asbestos Program***  
***(404) 363-7026***

***Issued By: Nathan Driggers***



# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)  
12/26/2024

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

**IMPORTANT:** If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

|                                                                                                                  |  |                                                                                                                                          |  |                                      |
|------------------------------------------------------------------------------------------------------------------|--|------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------|
| <b>PRODUCER</b><br>Mills Environmental Insurance Services LLC<br>4411 Suwanee Dam Rd Ste 410<br>Suwanee GA 30024 |  | <b>CONTACT NAME:</b> Patricia Mills<br><b>PHONE (A/C, No, Ext):</b> (770) 932-1229<br><b>E-MAIL ADDRESS:</b> patricia.mills@millseis.com |  | <b>FAX (A/C, No):</b> (404) 443-0649 |
| <b>INSURED</b><br><br>Hibernia Enterprises, Inc.<br>3680 Hewatt Court<br>Snellville GA 30039                     |  | <b>INSURER(S) AFFORDING COVERAGE</b>                                                                                                     |  | <b>NAIC #</b>                        |
|                                                                                                                  |  | <b>INSURER A:</b> Nautilus Insurance Company                                                                                             |  | 17370                                |
|                                                                                                                  |  | <b>INSURER B:</b> Key Risk Insurance Company                                                                                             |  | 10885                                |
|                                                                                                                  |  | <b>INSURER C:</b> Great Divide Insurance Company                                                                                         |  | 25224                                |
|                                                                                                                  |  | <b>INSURER D:</b>                                                                                                                        |  |                                      |
| <b>INSURER E:</b>                                                                                                |  |                                                                                                                                          |  |                                      |
| <b>INSURER F:</b>                                                                                                |  |                                                                                                                                          |  |                                      |

## COVERAGES

## CERTIFICATE NUMBER:

## REVISION NUMBER:

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

| INSR LTR                           | TYPE OF INSURANCE                                                                                         | ADDL INSD                                   | SUBR WVD | POLICY NUMBER | POLICY EFF (MM/DD/YYYY) | POLICY EXP (MM/DD/YYYY) | LIMITS                                                                          |
|------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------------------------|----------|---------------|-------------------------|-------------------------|---------------------------------------------------------------------------------|
| A                                  | <input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY                                          |                                             |          | ECP2013458-20 | 12/31/2024              | 12/31/2025              | EACH OCCURRENCE \$ 1,000,000                                                    |
|                                    | <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR                            |                                             |          |               |                         |                         | DAMAGE TO RENTED PREMISES (Ea occurrence) \$ 100,000                            |
|                                    | <input checked="" type="checkbox"/> Contractors Pollution - Occur                                         |                                             |          |               |                         |                         | MED EXP (Any one person) \$ 5,000                                               |
|                                    | <input checked="" type="checkbox"/> Professional - Claims-Made                                            |                                             |          |               |                         |                         | PERSONAL & ADV INJURY \$ 1,000,000                                              |
| GEN'L AGGREGATE LIMIT APPLIES PER: |                                                                                                           |                                             |          |               |                         |                         | GENERAL AGGREGATE \$ 3,000,000                                                  |
|                                    | <input checked="" type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC |                                             |          |               |                         |                         | PRODUCTS - COMP/OP AGG \$ 3,000,000                                             |
|                                    | OTHER:                                                                                                    |                                             |          |               |                         |                         | \$                                                                              |
| B                                  | <b>AUTOMOBILE LIABILITY</b>                                                                               |                                             |          | BAP2013459-20 | 12/31/2024              | 12/31/2025              | COMBINED SINGLE LIMIT (Ea accident) \$ 1,000,000                                |
|                                    | <input checked="" type="checkbox"/> ANY AUTO                                                              |                                             |          |               |                         |                         | BODILY INJURY (Per person) \$                                                   |
|                                    | <input type="checkbox"/> OWNED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS                        |                                             |          |               |                         |                         | BODILY INJURY (Per accident) \$                                                 |
|                                    | <input type="checkbox"/> HIRED AUTOS ONLY <input type="checkbox"/> NON-OWNED AUTOS ONLY                   |                                             |          |               |                         |                         | PROPERTY DAMAGE (Per accident) \$                                               |
|                                    |                                                                                                           |                                             |          |               |                         |                         | \$                                                                              |
| A                                  | <input type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> EXCESS LIAB                    |                                             |          | FFX2013457-20 | 12/31/2024              | 12/31/2025              | EACH OCCURRENCE \$ 5,000,000                                                    |
|                                    | <input type="checkbox"/> OCCUR <input type="checkbox"/> CLAIMS-MADE                                       |                                             |          |               |                         |                         | AGGREGATE \$ 5,000,000                                                          |
|                                    | DED \$ RETENTION \$                                                                                       |                                             |          |               |                         |                         | \$                                                                              |
| C                                  | <b>WORKERS COMPENSATION AND EMPLOYERS' LIABILITY</b>                                                      |                                             |          | WCA2016589-19 | 12/31/2024              | 12/31/2025              | <input checked="" type="checkbox"/> PER STATUTE <input type="checkbox"/> OTH-ER |
|                                    | ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH)                               | Y / N <input checked="" type="checkbox"/> N | N / A    |               |                         |                         | E.L. EACH ACCIDENT \$ 1,000,000                                                 |
|                                    | If yes, describe under DESCRIPTION OF OPERATIONS below                                                    |                                             |          |               |                         |                         | E.L. DISEASE - EA EMPLOYEE \$ 1,000,000                                         |
|                                    |                                                                                                           |                                             |          |               |                         |                         | E.L. DISEASE - POLICY LIMIT \$ 1,000,000                                        |

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Professional Liability - Claims-Made - Retro Date - 12/31/2011; Mold/CPL - Claims-Made - Retro Date 12/26/2002

Excess Policy includes coverage for General Liability, Business Auto, Employers Liability, and Contractors Pollution/Professional Liability.

## CERTIFICATE HOLDER

## CANCELLATION

Evidence of Insurance

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Patricia Mills <PM>

**Request for Taxpayer  
Identification Number and Certification**

Go to [www.irs.gov/FormW9](http://www.irs.gov/FormW9) for instructions and the latest information.

**Give form to the  
requester. Do not  
send to the IRS.**

**Before you begin.** For guidance related to the purpose of Form W-9, see *Purpose of Form*, below.

|                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                    |  |
|--------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Print or type.<br>See Specific Instructions on page 3. | <b>1</b> Name of entity/individual. An entry is required. (For a sole proprietor or disregarded entity, enter the owner's name on line 1, and enter the business/disregarded entity's name on line 2.)<br><b>HIBERNIA ENTERPRISES, INC.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                    |  |
|                                                        | <b>2</b> Business name/disregarded entity name, if different from above.<br><b>HIBERNIA ENTERPRISES, INC.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                    |  |
|                                                        | <b>3a</b> Check the appropriate box for federal tax classification of the entity/individual whose name is entered on line 1. Check only <b>one</b> of the following seven boxes.<br><input type="checkbox"/> Individual/sole proprietor <input type="checkbox"/> C corporation <input checked="" type="checkbox"/> S corporation <input type="checkbox"/> Partnership <input type="checkbox"/> Trust/estate<br><input type="checkbox"/> LLC. Enter the tax classification (C = C corporation, S = S corporation, P = Partnership) . . . . . <b>S</b><br><b>Note:</b> Check the "LLC" box above and, in the entry space, enter the appropriate code (C, S, or P) for the tax classification of the LLC, unless it is a disregarded entity. A disregarded entity should instead check the appropriate box for the tax classification of its owner.<br><input type="checkbox"/> Other (see instructions) | <b>4</b> Exemptions (codes apply only to certain entities, not individuals; see instructions on page 3):<br><br>Exempt payee code (if any) _____<br><br>Exemption from Foreign Account Tax Compliance Act (FATCA) reporting code (if any) _____<br><br>(Applies to accounts maintained outside the United States.) |  |
|                                                        | <b>3b</b> If on line 3a you checked "Partnership" or "Trust/estate," or checked "LLC" and entered "P" as its tax classification, and you are providing this form to a partnership, trust, or estate in which you have an ownership interest, check this box if you have any foreign partners, owners, or beneficiaries. See instructions . . . . . <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                    |  |
|                                                        | <b>5</b> Address (number, street, and apt. or suite no.). See instructions.<br><b>3680 HEWATT COURT</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Requester's name and address (optional)                                                                                                                                                                                                                                                                            |  |
|                                                        | <b>6</b> City, state, and ZIP code<br><b>SNELLVILLE, GEORGIA 30039</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                    |  |
|                                                        | <b>7</b> List account number(s) here (optional)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                    |  |

**Part I Taxpayer Identification Number (TIN)**

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

**Note:** If the account is in more than one name, see the instructions for line 1. See also *What Name and Number To Give the Requester* for guidelines on whose number to enter.

|                                       |   |  |   |   |   |   |   |   |     |
|---------------------------------------|---|--|---|---|---|---|---|---|-----|
| <b>Social security number</b>         |   |  |   |   |   |   |   |   |     |
|                                       |   |  | - |   |   |   | - |   |     |
| <b>or</b>                             |   |  |   |   |   |   |   |   |     |
| <b>Employer identification number</b> |   |  |   |   |   |   |   |   |     |
| 5                                     | 8 |  | - | 2 | 3 | 9 | 4 | 3 | 2 6 |

**Part II Certification**

Under penalties of perjury, I certify that:

- The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
- I am not subject to backup withholding because (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
- I am a U.S. citizen or other U.S. person (defined below); and
- The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

**Certification instructions.** You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and, generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

|                  |                                                                                                                        |                                       |
|------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------|
| <b>Sign Here</b> | <b>Signature of U.S. person</b><br> | <b>Date</b><br><b>January 3, 2025</b> |
|------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------------------|

**General Instructions**

Section references are to the Internal Revenue Code unless otherwise noted.

**Future developments.** For the latest information about developments related to Form W-9 and its instructions, such as legislation enacted after they were published, go to [www.irs.gov/FormW9](http://www.irs.gov/FormW9).

**What's New**

Line 3a has been modified to clarify how a disregarded entity completes this line. An LLC that is a disregarded entity should check the appropriate box for the tax classification of its owner. Otherwise, it should check the "LLC" box and enter its appropriate tax classification.

New line 3b has been added to this form. A flow-through entity is required to complete this line to indicate that it has direct or indirect foreign partners, owners, or beneficiaries when it provides the Form W-9 to another flow-through entity in which it has an ownership interest. This change is intended to provide a flow-through entity with information regarding the status of its indirect foreign partners, owners, or beneficiaries, so that it can satisfy any applicable reporting requirements. For example, a partnership that has any indirect foreign partners may be required to complete Schedules K-2 and K-3. See the Partnership Instructions for Schedules K-2 and K-3 (Form 1065).

**Purpose of Form**

An individual or entity (Form W-9 requester) who is required to file an information return with the IRS is giving you this form because they



## **Appendix G: Health and Safety Plan**

# Site Health and Safety Plan

**Willow Branch Apartments**

**822 N. Indian Creek Drive**

**Clarkston, Georgia**

January 6, 2026

Terracon Project No. HN257429

**Prepared for:**

Housing Development Corporation of DeKalb (HDC)  
Decatur, Georgia

**Prepared by:**

Terracon Consultants, Inc.  
Macon, Georgia

## INTRODUCTION

This Site Health and Safety Plan has been developed to ensure that Terracon personnel engaged in environmental services at Willow Branch Apartments performing Hazardous Materials Abatement Consulting, Observation, and Testing services, remain safe and leave the site uninjured at the end of each workday. The safety expectations for Terracon personnel working on this site are as follows:

- Follow the safety rules applicable to your job.
- If it is not safe, do not do it; do not have your co-worker do it either.
- If you see something that is unsafe, **speak up** immediately, there and then, to your supervisor, no matter who—no matter what.
- If you are not sure of something or do not understand something, **speak up and ask**.

All Terracon employees have the right to expect management cooperation in helping to keep them safe. Here is what you can expect from Terracon management while engaging in services at this project site:

- If you stop a task for a safety reason, we will back you up.
- If you bring up a safety concern, we will address it promptly.
- If there is an injury, we will conduct an incident investigation in a way that does not blame anyone—the person or people involved. The investigation will focus on learning, so that we can eliminate the next injury.

All employees are expected to conduct field operations in alignment with our Incident and Injury-Free (IIF) principles, ensuring a proactive commitment to safety, accountability, and care for themselves and others:

- Evaluate the hazards of the work you are getting into and control the hazards to the extent practical before engaging in site services.
- Be observant to people who are inexperienced anxious about their work and for those who are being complacent with safe work procedures. Speak up to both, out of care and concern, and help them see that doing their work safely is the right thing to do for both them and their families.
- Be open if someone speaks to you about potential unsafe behaviors or equipment and cooperate in the spirit of getting the job done safely. Everybody deserves a future.



## Site Safety and Health Plan

Willow Branch Apartments ■ Clarkston, Georgia  
January 6, 2026 ■ Terracon Project No. HN257429



### 1.0 APPLICABILITY

The guidelines in this Health and Safety Plan are based upon potential health hazards from exposure to on-site hazards including asbestos. Sampling activities will be performed in accordance with applicable federal/state health and safety regulations. The site Safety Officer is responsible for enforcing the provisions contained in this plan.

### 2.0 SAFETY AND HEALTH ADMINISTRATION

The Project Manager is ultimately responsible for ensuring that all work on this project is performed in accordance with the safety and health provisions outlined in this Plan. The designated Site Safety and Health Officer (SSO) will monitor compliance with this Plan throughout field activities. All field team members involved in project activities will be required to sign the Acknowledgment of Instruction form included with this Plan. The SSO will maintain a copy of this Plan on site for the duration of the project.

Subcontractors engaged in project activities at this site must comply with the applicable provisions of the Occupational Safety and Health Act of 1970, the safety and health requirements set forth in OSHA regulation 29 CFR 1910.120 (where applicable), and any relevant state, city, or local safety codes. Each subcontractor is responsible for providing and using the necessary equipment to ensure the safety of their employees working on this project.

To reduce the potential for accidents, subcontractors are expected to maintain an orderly and safe work area. It is the responsibility of each subcontractor to provide any safety barricades or warning devices deemed necessary by Terracon to prevent accidents or injuries to field personnel and the general public.

Subcontractors working on this project may adopt this Site Safety and Health Plan for their employees or may develop and implement their own site-specific Safety and Health Plan, provided that its provisions are at least as stringent as those contained in this Plan. Determinations regarding the equivalency of safety and health requirements will be made by the Terracon Project Manager and the Corporate Safety and Health Manager. Adoption of this Site Safety and Health Plan by subcontractor employers does not relieve any subcontractor of the responsibility for the health and safety of its employees.

Terracon and subcontractor task leaders (if any) will be responsible for:

- Providing subordinate personnel a copy of this Plan, and briefing them on its content.
- Enforcing the applicable provisions of this Plan.
- Inspecting and maintaining equipment in compliance with applicable federal, state or local safety regulations.
- Enforcement of corrective actions.

**Site Safety and Health Plan**

Willow Branch Apartments ■ Clarkston, Georgia  
January 6, 2026 ■ Terracon Project No. HN257429



- Investigation of accidents or injuries.

The following individuals will be responsible for implementation and enforcement of the Plan:

| <b><u>TITLE</u></b>                  | <b><u>NAME</u></b> | <b><u>PHONE</u></b> |
|--------------------------------------|--------------------|---------------------|
| Terracon Project Manager             | Tameka Gordon      | 478-757-1606        |
| Terracon SSO                         | Todd Peterman      | 478-757-1606        |
| Safety and Health Director           | Jim Wright         | 913-523-5044        |
| HDC Contact                          | Tim Johnson        | 470-440-8558        |
| Abatement Contractor Contact         | Robert Heavey      | 678-618-0461        |
| Abatement Contractor Project Manager | Jhonton Fornos     | 404-421-5418        |

### **3.0 EMPLOYEE TRAINING REQUIREMENTS**

Field personnel completing air monitoring activities for this project will have successfully completed and currently hold accreditations as an Asbestos Contractor/Supervisor, in accordance with EPA TSCA Title II and LAC 33:III.2799 Appendix A.

Prior to the start of site activities, the SSO will conduct a pre-project safety and health briefing for all project participants. The personnel responsible for project safety and health will be addressed, as will site history, scope of work, site control measures, emergency procedures and site communications. The briefing will address site contaminants, air monitoring protocols and results and the level of personal protective equipment to be employed for each project task.

Daily "tailgate" safety and health briefings will be presented by the SSO at the start of each work day. In addition to a general review of the proposed daily activity and safety requirements, the results of previous air monitoring and any procedural changes will be addressed. A daily tailgate safety meeting documentation form is attached as an Appendix to this plan.

## **4.0 SITE HISTORY/SCOPE OF SERVICES**

The site is located at 822 North Indian Creek Drive in Clarkston, DeKalb County, Georgia and is comprised of one tax parcel (Parcel No. 18 067 01 026). The site encompasses approximately 13.7 acres and consists of 14, two-story buildings housing 186 residential units and one office/community building and a laundry room. The buildings were constructed in 1971. According to tax records, the site has been owned by Willow Investment Partners, LLC since 2013.

The HDC intends to renovate the property, however, asbestos-containing materials (ACM) have been identified at the site and are planned for remediation.

### **4.1 Scope of Services**

Terracon will provide an industrial hygiene technician(s) with applicable accreditation to perform daily air monitoring and/or project observations for ongoing asbestos work.

Daily field reports outlining Terracon's work will be uploaded to Compass, Terracon's client-document website for review by the client and/or project team. Daily field reports include a summary of the work day's events/project progress, photographs, sample location maps, and analytical data. Please note, urgent information will be conveyed via phone call and/or email.

Project observation activities will be performed to document abatement and remediation activities and apparent compliance with federal, state, and local regulations and the QAPP.

Should newly identified, suspected ACM be encountered during the demolition/abatement process, the client may request Terracon to collect bulk samples for Polarized Light Microscopy (PLM) analysis by an accredited laboratory.

Terracon will perform daily visual inspections of ongoing leaded paint work.

Prior to work commencing, Terracon may collect representative dust samples at the exterior of the structure to establish baseline lead concentrations for the proposed work area's surrounding locations.

## **5.0 HAZARD ASSESSMENT**

### **5.2 Building Material Hazards**

Work will involve the collection of air and dust samples corresponding to work that is disturbing asbestos and lead-containing paints. Engineering controls outlined in the *Hazardous Materials Abatement Specification* are implemented to mitigate exposure outside of designated work areas. However, when a work area is entered, Terracon personnel will utilize appropriate PPE. Given



the engineering and administrative controls, there is little potential for exposure to airborne asbestos or lead.

Asbestos is a recognized human carcinogen. It causes asbestosis, cancer of the lungs and digestive tract and mesothelioma. Asbestosis is a lung disorder characterized by a diffuse interstitial (between cell) fibrosis. The onset of asbestosis probably depends upon the asbestos dust concentration, the morphology of the fiber and length of exposure. Cigarette smoking is strongly implicated as a co-carcinogenic among asbestos workers. The OSHA Permissible Exposure Limit for asbestos is 0.1 fiber per cubic centimeter (0.1 f/cc) of air.

### **5.3 Sampling Precautions**

Respiratory protection within sampling areas will consist of half-mask, negative-pressure, air-purifying respirators (APR) equipped with N-, R-, or P-100 particulate cartridges.

If performed, asbestos bulk sampling activities must be conducted in a manner which minimizes the generation of dust and airborne fibers. Each sample team member will assess the condition of ACM prior to sampling or otherwise disturbing the materials. Sampling will not be conducted in buildings occupied by non-project personnel, or over the heads of any personnel. Wherever possible, sample collection will be conducted at a level below the breathing zone of the sampler. Terracon to apply amended water to sampling locations to minimize fiber release.

If sampling impregnated materials or other ACMs appear non-friable (floor tiles, mastic, roofing felt or sealant, ceiling tile, etc.), respiratory protection should not be required. If collecting samples of friable ACM or normally non-friable materials which are in deteriorated condition, precautions must be taken to prevent the release of fibers to the work area. Precautions include isolation of the material prior to disturbance via wet methods.

Personnel should be aware that as personal protective equipment increases, dexterity and visibility may be impacted and performing some tasks may be more difficult.

### **5.4 Site Physical Hazards/Precautions**

The physical hazards associated with intrusive site activities can include inclement weather, material handling, slips/falls etc. Some anticipated hazards and means for preventing injury from those hazards are as follows:

- **Back injuries due to improper lifting** - Use proper lifting techniques. Lift with the legs, not the back. Keep loads close to the body and avoid twisting. Loads heavier than 50 pounds (lbs.) require a second person or mechanical device for lifting. Use mechanical

devices such as drum dollies, hand trucks, and tool hoists (for lifting augers) to lift or move heavy loads whenever possible.

- **Ergonomic Stress** - Lift carefully with load close to body with the legs taking most of the weight. Get help with lifts greater than 40 lbs. When working with a heavy tool or object, keep legs under the load and do not overreach or twist to the side. Reposition body to be more square to the load and work. Push loads, rather than pull, whenever feasible. Do not persist with lifting when the load is too heavy. Use a mechanical lifting aid or have a coworker assist with the lift. Rotate repetitive tasks to avoid soft-tissue fatigue.
- **Falls From Elevated Surfaces** - Protect employees from falling off surfaces that have a side or an edge that is 6 ft. or more above a lower level. Provide a safety harness and shock-absorbing lifeline or adequate fall protection where applicable. Employees must wear them when working 6 ft. or higher above the platform or main work deck. Install either a guardrail system or fall arrest system that conforms to 29 CFR 1926.502 (d) and is approved by the American National Standards Institute.
- **Vehicles** - Obey all site traffic signs and speed limits. Seat belts must be functional and in use during operation of any site vehicles (including rentals). Operator shall regularly inspect the vehicle for defective parts, such as brakes, controls, motor, chassis and drives. Always be aware and stay alert to traffic around the work area.
- **Inclement Weather** – The project may be shut down by the SSO during the following inclement weather conditions: poor visibility; precipitation severe enough to impair safe movement or travel; lightning in the immediate area; steady winds in excess of 40 mph; or, other conditions as determined by the SSO or Corporate Safety and Health Manager. Work will resume when the conditions are deemed safe by the SSO.
- **Noise** - Wear hearing protection when speech becomes difficult to understand at a distance of 10 ft. and while standing within 20 to 25 ft. from heavy equipment, pneumatic power tools, steam cleaners, and other equipment in operation that can generate more than 85 decibels (A-weighted scale) (dB).
- **Slips, Trips, and Falls** - Clear work area of obstructions and debris before setting up. Alter work areas as necessary to provide a safe, reasonably level area. All walking and working surfaces shall continually be inspected and maintained to be free of slip, trip, and fall hazards. Keep platforms, stairs, and immediate work areas clear. Do not allow oil, grease, or excessive mud to accumulate in these areas. Eliminate slip, trip, and fall hazards or identify them clearly with caution tape, barricades, or equivalent means. Store loose or light material and debris in designated areas or containers. Secure tools, materials, and equipment subject to displacement or falling.

- **Traffic Control** - If site activities interrupt the normal flow of pedestrian or vehicular traffic, barricades and warning signs which comply with the Manual on Uniform Traffic Control Devices and/or State or local ordinances will be erected around affected equipment. Safety orange work vests will be worn by personnel.
- **Confined Spaces** – No work will be conducted within confined spaces without discussion with the Corporate Safety and Health Manager and development of a confined space safety plan and permit.

## **6.0 REGULATED AREA CONTROL**

### **Asbestos**

During asbestos abatement, engineering control measures are essential to prevent the release of hazardous fibers and to protect individuals who are not authorized or trained to be in the work zone. The abatement area is fully enclosed using polyethylene sheeting and sealed with critical barriers to isolate it from adjacent spaces. A negative air pressure system is maintained within the containment to ensure that any airborne fibers are drawn inward and filtered through HEPA units, preventing their escape.

Access to the containment is limited to trained and authorized personnel only. Entry and exit are controlled through a decontamination unit, typically consisting of an equipment room, a shower, and a clean room. Workers must wear appropriate personal protective equipment (PPE), including disposable coveralls and respirators, and must follow a strict decontamination process when leaving the area.

Warning signs are posted at all entrances, clearly stating the presence of asbestos and the restricted nature of the area. These signs comply with OSHA regulations and serve to alert anyone nearby of the potential hazard. Air monitoring is conducted both inside and outside the containment to verify the effectiveness of the controls and to ensure that no fibers are escaping into adjacent areas. More specific work area preparation and sequencing is provided in the Specification.

## **7.0 AIR MONITORING AND SITE ACTION LEVELS**

This air monitoring protocol is designed to prevent personnel exposure to airborne contaminants in excess of established permissible exposure limits.

Terracon will perform daily air sampling outside of the regulated work areas throughout the duration of the abatement. All collected asbestos air samples will be analyzed by Phase Contrast

Microscopy (PCM) in accordance with a modified National Institute for Occupational Safety and Health (NIOSH) Method 7400 and compared to the standard of 0.01 fibers per cubic centimeter (f/cc).

## **7.0 PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS**

The air monitoring regimen identified above will allow initial project activity to begin in LEVEL D personal protective equipment to include:

- **Hard Hat**
- **Safety Footwear (ASTM spec; Impermeable or with outer impermeable covers)**
- **Safety Eye Wear (ANSI Z-87 specification)**

Respirator cartridges will be changed as needed.

The Terracon Project Safety Officer will ensure that all project personnel mobilize the following personal protective equipment to the project site on each day of asbestos sample collection:

- Half face or full-face air purifying respirator equipped with HEPA cartridges
- Impermeable gloves (nitrile or latex)
- Tyvek boot covers or washable outer footwear
- ANSI specification Safety eyewear

Personnel will remove protective clothing before proceeding out of the regulated work areas at the project site.

## **9.0 DECONTAMINATION**

1. Remove Outer PPE: In the equipment room, remove disposable coveralls, gloves, and boots. Place in labeled asbestos waste bags.
2. Respirator Remains On: Keep respirator on until final step.
3. Shower: Enter the shower room. Wash thoroughly, including hair and under fingernails.
4. Respirator Removal: After showering, remove and clean the respirator.
5. Clean Area Exit: Exit through the clean room in clean clothes.

### **9.1 Equipment Decontamination**

1. HEPA Vacuum: Use a HEPA vacuum to remove visible dust and debris.
2. Wet Wipe: Wipe down all surfaces with damp cloths or approved cleaning solution.

## 10.0 SITE COMMUNICATIONS

Communication between personnel within the Exclusion Zone will be via verbal communication or hand signals. Visual contact between members of task teams should be possible throughout the course of project activities. Contact with the SSO will be through direct verbal communication. The following hand signals will be used by personnel wherever respiratory protection and/or equipment noise limit verbal communication.

| Signal                                       | Meaning                |
|----------------------------------------------|------------------------|
| Thumbs Up                                    | OK; all is well        |
| Grab throat with both hands                  | Can't breathe          |
| Shake head, thumbs down                      | NO, negative           |
| Point right (when facing equipment operator) | Move/steer left        |
| Point left (when facing equipment operator)  | Move/steer right       |
| Grab partner's wrist                         | Leave area immediately |

## 11.0 EMERGENCY RESPONSE PROCEDURES

The Project Manager is responsible for obtaining and recording the following emergency information prior to site mobilization:

**Location of Nearest Telephone:** On Site Cellular Phones

**Nearest Hospital/Clinic:** Emory University Hospital: 404-712-7100

**Estimated Drive Time:** 20 min

**Directions From Site: (Attach a Site Diagram as an Appendix to this Plan)**

1364 Clifton Road NE, Atlanta, Georgia 30322

**See Attached Directions**

|                                         |                       |
|-----------------------------------------|-----------------------|
| <b>Ambulance:</b>                       | <b>911</b>            |
| <b>WorkCare (Managed Care Provider)</b> | <b>888-449-7787</b>   |
| <b>Fire Department:</b>                 | <b>911</b>            |
| <b>Police:</b>                          | <b>911</b>            |
| <b>Poison Control Center:</b>           | <b>1.800.222.1222</b> |

**Project Manager:** **478-757-1606**

**Safety and Health Director:** **(913) 599-6886**

### **11.1 Personal Injury**

In the event of non-life threatening injuries such as minor cuts, burns, exhaustion, heat cramps, insect stings, etc., the affected employee will be removed to a safe location and appropriate first aid measures should be rendered. It is the responsibility of every employee to report all unsafe acts and incidents (equipment or facility damages as well as injury accidents) to their direct supervisor as soon as possible. Personnel who incur injuries not requiring immediate medical attention are instructed to call WorkCare at 888-449-7787. The affected supervisor will complete an Accident/Injury Investigation form within 48 hours of the incident, and forward it to their home office or enter it directly into Terracon's Automated Claims Management System. Details will be shared with the client and/or contractor as may be required by contractual agreement. A root cause analysis will be prepared by the affected Office Manager. All reports must include written recommendations of actions the office will take to prevent a recurrence of the incident.

For more serious injuries the Site Safety Officer or designee will summon an ambulance to the project site. No attempt will be made by Terracon personnel to move the victim, without the aid and/or instructions of qualified medical personnel.

Where air monitoring indicates the absence of toxic gases or vapors, the ambulance will be directed to the affected employee. If site conditions warrant and as time permits, the wheels of the ambulance will be decontaminated with high pressure wash. The SSO or designee will accompany the ambulance to the medical facility, and provide guidance concerning additional decontamination which may be required for the injured employee, ambulance or attendants.

Whenever an injury occurs on sites with contamination requiring personal protective equipment greater than Level D modified, a minimum of two employees will obtain appropriate equipment and proceed to the victim. An ambulance will be called immediately. If the extent of injuries permit, the injured employee will be removed to fresh air. Appropriate first aid will be administered.

If rescuer(s) assess that the victim cannot be removed without a stretcher or other specialized equipment, the victim will be removed at the earliest possible moment by appropriately attired Terracon personnel with the direction and/or assistance of qualified medical response personnel. The injured employee will be immediately decontaminated and transported to the nearest medical facility. A crew member designated by the SSO will inform the ambulance crew of contaminants of concern and provide assistance with additional decontamination if required.



## **11.2 Evacuation and Shutdown Procedures**

The SSO will establish and notify site personnel of emergency "rally" points. In the event of a site emergency, personnel will immediately exit the site and assemble at the designated rally point. Evacuation routes will be dependent on site topography and wind conditions. The routes will be selected and presented by the SSO daily prior to site activity.

If emergency evacuation becomes necessary, the SSO will sound the emergency alarm (e.g. support vehicle horn or compressed air horn). Personnel will safely shutdown all electrical and mechanical equipment and quickly proceed to closest designated rally point. The SSO will then account for each crew member on site.

In the event that a Terracon employee does not report to the designated rally point within 5 minutes of the evacuation alarm, the SSO will perform an immediate assessment of site conditions. If site conditions do not pose an immediate hazard to life or health, the SSO will initiate search and rescue efforts utilizing two crew members attired in appropriate personal protective equipment.

## **12.0 THERMAL STRESS**

### **12.1 Heat Stress**

Whenever ambient temperature exceeds 70 degrees F and personal protective equipment requirements are Level D or Level D modified, the following heat stress monitoring and preventive measures will be implemented:

- Mobilize at least one gallon of water for each field employee during each day of site activity.
- Periodically observe personnel for signs of heat stress (excessive perspiration, flushed skin, nausea, etc.).
- Move affected workers out of contaminant zones,
- Loosen protective clothing and permit them to rest
- Have conscious, affected personnel drink at least one 8 oz. glass of cool water.
- Check pulse; personnel should not return to work until pulse rate is less than 90 beats/min.

### **12.2 Heat Stress in Level C/Level B PPE**

In addition to the above precautions, the following procedures will be implemented whenever the ambient temperature exceeds 70° F and personal protective equipment requirements are Level C or above. Ambient temperature will be measured with a dry bulb thermometer and percent cloud cover will be estimated:

## Site Safety and Health Plan

Willow Branch Apartments ■ Clarkston, Georgia  
January 6, 2026 ■ Terracon Project No. HN257429



1.0 = No Clouds  
0.75 = 25% Clouds  
0.5 = 50% Clouds  
0.25 = 75% Clouds  
0.0 = 100% Clouds).

Calculate the adjusted temperature using the following formula:

$$\text{ADJUSTED TEMPERATURE} = 13(\% \text{ CLOUD COVER}) + \text{DRY TEMPERATURE}$$

Rest regimens will be implemented at frequencies dependent upon adjusted temperature. Monitor pulse during each rest period.

| Adjusted Temperature | Rest Period/Monitoring Frequency |
|----------------------|----------------------------------|
| 90+                  | After 15 minutes                 |
| 87.5-90              | After 30 minutes                 |
| 82.5-87.4            | After 60 minutes                 |
| 77.5-82.5            | After 90 minutes                 |
| 70.5-77.4            | After 120 minutes                |

Employees will return to work only after their pulse rate is below 90. Fluid replacement will be encouraged during each rest period. The use of stimulants and alcoholic beverages in off hours should be discouraged to prevent heat related illnesses.

## 13.0 TRAFFIC CONTROL

Worksites confront motorists with a situation they do not expect, cannot anticipate and find confusing. They also tend to create hazards with which the driver can collide. Worksites distract motorist's attention from the driving tasks and expose workers to oncoming traffic.

Some inadequate traffic control measures that have led to worksite traffic accidents include:

- Inadequate advance warning
- Inadequate and inappropriate signs and messages
- Confusing messages
- Inadequate guidance through the work zone
- Conflicting pavement markings
- Unprotected hazard such as shoulder drop offs

## Site Safety and Health Plan

Willow Branch Apartments ■ Clarkston, Georgia  
January 6, 2026 ■ Terracon Project No. HN257429



Whenever project sites under Terracon control will disrupt vehicle traffic or expose Terracon personnel to the hazards of vehicle traffic, (i.e., work on an active roadway, including shoulders) adequate traffic control measures must be implemented.

Terracon's preferred method for implementing traffic control is to request that clients assume this responsibility. Where clients refuse to assume responsibility, Terracon will attempt to sub-contract the service to a reputable traffic control firm. Terracon personnel with no training or experience in traffic flagging or the placement of traffic control devices such as signs, barricades or flashers are prohibited from engaging in traffic control operations unless directed by a trained and experienced individual.

### **Project-Specific Traffic Control Requirements**

The Project Manager will be primarily responsible for assuring that traffic control measures utilized on the various compressor station project sites (where applicable) are in accordance with Department of Transportation requirements. All Terracon personnel working within 10 feet of an active roadway will wear ANSI Class III traffic safety vests as the outermost garment. All Terracon field personnel will participate in site traffic control briefings with affected field representatives where requested.

#### **14.0 MOTOR VEHICLE SAFETY**

Vehicles must be periodically inspected in accordance with Terracon motor vehicle operations policies. Any vehicle found to be unsafe shall not be operated and shall be removed from service until it can be repaired or serviced and rendered safe. Driving at the maximum posted speed limit can be too fast for safety in some situations.

Drivers shall use good judgment and proceed at a speed suitable for the conditions of the vehicle, road, traffic, and weather. Vehicles are not to be moved until all passengers are properly seated inside the vehicle. All operators and passengers must use seat belts and shoulder harnesses, if the vehicle is so equipped.

Before driving, all windows should be cleared of any materials such as frost, mud, or dew that may reduce visibility. Drivers should not engage in distracting activities while a vehicle is in motion. The vehicle should be pulled over to the side of the road and stopped when performing activities such as dialing or using a mobile telephone or taking notes. If the phone rings while driving, let the cellular voice mail service take the call and listen to the message later when you are parked.

Vehicles should be properly parked. When possible, they should be parked so that no backing is required when leaving, unless doing so creates a greater hazard. Where backing is required when leaving a location, the driver shall walk around the vehicle prior to backing and inspect the area for any potential obstructions, or use a spotter. Hazard lights shall be utilized when parking on a

**Site Safety and Health Plan**

Willow Branch Apartments ■ Clarkston, Georgia  
January 6, 2026 ■ Terracon Project No. HN257429



road shoulder. Bridge load limits should be reviewed and a pre-approved route established prior to transporting heavy equipment over county road bridges.

Items carried inside the vehicle should be secured to prevent them from being thrown about in event of emergency braking or sharp maneuvers. Items that cannot be secured must be carried in an enclosed trunk or luggage compartment that is physically separated from the passenger area.

All large tools should be carried outside the cab of the vehicle and be properly secured. All fittings, tools, supplies, equipment, and other cargo carried on cargo beds or in the back of trucks must be properly secured and restrained.

## ACKNOWLEDGMENT OF INSTRUCTION

I understand this project involves the impacts to ACM. I have read this Health and Safety Plan and have received instructions for safe work practices, personal protective equipment and air monitoring requirements. I further understand that if I encounter unanticipated contamination or site conditions I am to leave the site and immediately notify the Project Manager and Corporate Safety and Health Manager of the conditions observed.

**PROJECT NAME:** \_\_\_\_\_

**TERRACON JOB #:** \_\_\_\_\_

| <u>Name (Please Print)</u> | <u>Signature</u> | <u>Date</u> |
|----------------------------|------------------|-------------|
| _____                      | _____            | _____       |
| _____                      | _____            | _____       |
| _____                      | _____            | _____       |
| _____                      | _____            | _____       |
| _____                      | _____            | _____       |
| _____                      | _____            | _____       |
| _____                      | _____            | _____       |

**PERSONAL PROTECTIVE EQUIPMENT UTILIZED:**

\_\_\_\_ LEVEL D      \_\_\_\_ LEVEL D MOD.      \_\_\_\_ LEVEL C

**Safety briefing performed by:** \_\_\_\_\_ **Date:** \_\_\_\_\_

# **Appendix H:**

## **Project Specifications**



# **SPECIFICATIONS FOR REMOVAL OF ASBESTOS CONTAINING MATERIALS**

**Willow Branch Apartments  
822 North Indian Creek Drive  
Clarkston, Georgia 30286**

Prepared for:

**Mr. Tim Johnson  
Housing Development Corporation of Dekalb  
124 S. Columbia Drive  
Decatur, Georgia 30030**

Prepared by:



Terracon Consultants, Inc.  
514 Hillcrest Industrial Boulevard  
Macon, Georgia 31204

TERRACON PROJECT HN257348

A handwritten signature in black ink, appearing to read 'Todd K. Peterman'.

Todd K. Peterman  
Georgia Certified Project Designer # 4796

A handwritten signature in blue ink, appearing to read 'Tameka Gordon'.

Tameka Gordon  
Environmental Department Manager  
Senior Associate

November 3, 2025

## **TABLE OF CONTENTS**

### **I. TECHNICAL SPECIFICATIONS**

### **Section Number**

#### **General Requirements**

|                                                      |       |
|------------------------------------------------------|-------|
| Project Coordination .....                           | 01043 |
| Codes and Regulations .....                          | 01092 |
| Air Monitoring .....                                 | 01410 |
| Temporary Facilities .....                           | 01503 |
| Work Area Preparation .....                          | 01526 |
| Worker Protection .....                              | 01560 |
| Respiratory Protection .....                         | 01562 |
| Decontamination Units .....                          | 01563 |
| Project Decontamination .....                        | 01711 |
| Work Area Clearance .....                            | 01714 |
| Asbestos Removal .....                               | 02080 |
| Disposal of Asbestos-Containing Waste Material ..... | 02084 |

Appendix: Hazardous Materials Inspection Report

## **Asbestos Removal Specifications**

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



### **SECTION 01043**

## **PROJECT COORDINATION**

### **1.01 GENERAL**

- A. The Contractor shall be a Georgia Asbestos Abatement Contractor licensed by the Georgia Environmental Protection Division (GAEPD)
- B. The Contractor shall be responsible for inspecting the site prior to commencing work to confirm the scope of the work. Any quantities listed by the designer in the plans, specifications or survey are done so as approximations. The calculation and verification of actual quantities of materials to be encountered is the responsibility of the Contractor.
- C. The Contractor shall furnish and is responsible for all costs including, but not limited to permit fees, labor, materials, services, insurance, bonding and equipment necessary to carry out the requirements of this contract in accordance with the plans and specifications, the EPA and OSHA regulations, and any applicable state and local government regulations.
- D. The Contractor/Employer has and assumes the responsibility of proceeding in such a manner that he offers his employees a workplace free of recognized hazards causing or likely to cause death or serious injury.
- E. The Contractor will be responsible for all costs associated with employee monitoring to meet applicable OSHA requirements.
- F. The Contractor is responsible for all costs, including additional visits by third parties, should the Designer and/or the Owner determine that the contractor failed a final inspection. Notification and scheduling of the final inspection during the project is the responsibility of the Contractor. The Contractor will allow a minimum notice of 48 hours unless a different time frame is agreed upon by the Designer and the Contractor.

### **1.02 PERSONNEL**

- A. Supervisor
  - 1. All supervisors shall have completed the asbestos 40-hour AHERA asbestos supervisor training from a training provider approved by the State of Georgia and must have current training certificates.
  - 2. All persons responsible for the placement of air sampling cassettes for the purposes of required OSHA worker exposure monitoring and/or subsequent PLM analysis shall have completed the above-mentioned asbestos 40-hour AHERA asbestos supervisor training and shall have completed a NIOSH 582 or equivalent course.

## Asbestos Removal Specifications

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



3. All supervisors on the project shall have a minimum of five years' experience in the administration and supervision of asbestos abatement projects including work practices, protective measures for building and personnel, disposal procedures, etc.
  4. One supervisor shall be provided for every 10 workers inside the regulated work area. A minimum of one supervisor shall be provided per project. A minimum of one supervisor shall be inside the regulated work area during abatement activities.
  5. The Contractor shall have at least one employee on the job site in either a foreman or supervisor's position that is bilingual in the appropriate languages when employing workers who do not speak fluent English.
  6. A minimum of one supervisor per company shall have attended a 24-hour respiratory protection course.
- B. Worker
1. All workers shall have completed the AHERA asbestos worker training from a training provider approved by the State of Georgia and must have current training certificates.
- C. Competent Person
1. A competent person, as defined in the OSHA asbestos standard 29 CFR 1926.1101, employed by the Contractor must be outside the work area at all times to monitor activity, ensure containment security, provide information to visitors, and provide access to the work area.
- D. Employees
1. The Contractor is responsible for the behavior of workers within his employment. If at any time during the contracted work, any of his employees are judged to exhibit behavior unfitting for the area or judged to be a nuisance by the owner or designer, the contractor shall remove them immediately from the project.
  2. The Contractor shall be responsible for compliance with the following concerning employee behavior:
    - a. Under no circumstances is alcohol, drugs or any other type of controlled substances permitted on the property. Under no circumstances shall firearms be permitted on the property.
    - b. All workers are restricted to the project site only.

## Asbestos Removal Specifications

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



- c. All vehicles must be parked in areas prearranged with the Owner.
  - d. All workers must conform to the following basic dress code when in public areas of the project confines: long pants, shirts, no tank tops, no shorts, no bare backs.
  - e. The Contractor is responsible for disposal of all trash brought on the property by his employees, including drink cans, bottles or other food containers and wrappers.
3. Failure to adhere to these rules could result in criminal prosecution and/or removal from the site.

### 1.03 PRE-JOB SUBMITTALS

- A. Work is prohibited until submittal package has been reviewed and approved by consultant acting on behalf of the client. A copy of the approved submittals shall be kept in a binder as part of the project log by the Contractor at the project site in the clean room or in the on-site office of the Contractor for inspection.
1. Notifications: Where applicable, provide copies of Asbestos Permit Application and Notification for Demolition/Renovation, which provide written notice to all required agencies.
  2. Employee List: Provide copies of lists of supervisors and workers who may reasonably be expected to be onsite for at least one day or part day during the project, along with their accreditation, to be utilized on the project.
  3. Medicals: Provide copies of current medical information indicating the employee has been medically cleared to perform the work outlined herein.
  4. Permits: Provide copies of approval of a waste disposal site in compliance with 40 CFR 61.154.
  5. Respirator Training: Copies of most recent fit testing records, individually signed for each worker to be utilized on the project.
  6. Project Schedule: Time schedule for the project, outlining the proposed start, setup, clearances, etc. for the various phases of the project.
  7. Initial Exposure Assessment: As required by the OSHA construction asbestos standard 29 CFR 1926.1101.
  8. Safety Data Sheets: Provide SDS for chemical materials to be used during the project, including (but not limited to) solvents, cleaners, and encapsulants.
  9. Any other programs or training as outlined by the OSHA and EPA standards.

## **Asbestos Removal Specifications**

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



### **1.04 POST-JOB SUBMITTALS**

- A. A copy of post-job submittals shall be sent to the Consultant for initial review following the final completion of the work. Consultant will either approve or reject the submittals with a request for changes following which the Contractor will submit to the Owner. Requests for final payment will not be approved until the submittal package has been reviewed and approved by the owner.
  - 1. Affidavits: Contractor's affidavit of payment of debts and claims, affidavit of release of liens, and consent of surety company to final payment.
  - 2. Manifest: Receipt from landfill operator which acknowledges the contractor's deliveries of waste material. Include date, quantity of material delivered and signature of authorized representative of landfill. Also include name of waste transporter.
  - 3. Daily Log: A notarized copy of all daily logs showing the following: name, date, entering and leaving time, company or agency represented, any new workers added to the job, reason for entry for all persons entering the work area, employees' daily air monitoring data as required by the OSHA standard and written comments by inspectors, industrial hygienists, designers and visitors.

### **1.05 CONTINGENCY PLAN**

- A. Contingency Plan: Prepare a contingency plan for emergencies including fire, accident, power failure, negative pressure system failure (if applicable), supplied air system failure (if applicable), evacuation of injured persons for both life threatening and non-life threatening, or any other event that may require modification or abridgment of decontamination or work area isolation procedures. Include in plan specific procedures for decontamination or work area isolation. Note that nothing in this specification should impede safe exiting or providing of adequate medical attention in the event of an emergency. These plans will be kept in the on-site office or clean area.
- B. Post outside/in clean room of Personnel Decontamination Unit:
  - 1. Telephone numbers and locations of emergency services including (but not limited to) fire, ambulance, doctor, hospital, police, power company, telephone company and the GAEPD.
  - 2. A copy of Safety Data Sheets (SDS) for any chemicals used during the asbestos project.
  - 3. The contractor shall post asbestos DANGER signs in each appropriate language as per the OSHA 29 CFR 1926.1101 standard.



## **Asbestos Removal Specifications**

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



### **SECTION 01092**

## **CODES AND REGULATIONS**

### **1.01 REFERENCE SPECIFICATIONS**

The Contractor shall assume full responsibility and liability for compliance with all applicable federal, state, and local regulations pertaining to work practices, hauling, disposal and protection of workers, visitors to the site, and persons occupying areas adjacent to the site.

Unless modified by these project specifications, all specifications for stripping, removal, repair and disposal work shall conform to the following specifications and standards, as applicable, as if completely reproduced herein.

A. The following regulations published by the Environmental Protection Agency (EPA):

1. "Asbestos Hazards Emergency Response Act" (AHERA), 40 CFR Part 763, Appendix A, to Subpart E, Section III.
2. "National Emissions Standards for Hazardous Air Pollutants" (NESHAP), 40 CFR Part 61, Subpart M (Asbestos).
3. "General Provisions," 40 CFR Part 61, Subpart A.
4. "Guidance for Controlling Asbestos-Containing Materials in Buildings" June 1985. (EPA # 560/5-85-024).

B. The following regulations published by the U.S. Department of Labor (OSHA):

1. "Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite; Final Rules," Title 29, Part 1910, Section 1001 and Part 1926, Section 1101 of the Code of Federal Regulations.
2. "Respiratory Protection," Title 29, Part 1910, Section 134 of the Code of Federal Regulations.
3. Occupational Safety and Health Standard for the Construction Industry Title 29 CFR Part 1926.
4. "Access to Employee Exposure and Medical Records," Title 29, Part 1910, Section 20 of the Code of Federal Regulations.
5. "Hazard Communication," Title 29, Part 1926, Section 59 of the Code of Federal Regulations.

## Asbestos Removal Specifications

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



6. "Specifications for Accident Prevention Signs and Tags," Title 29, Part 1910, Section 145 of the Code of Federal Regulations.
- A. State Requirements: Which govern asbestos abatement work or hauling, and disposal of asbestos waste materials include, but are not limited to, the following:
  1. GAEPD Rule 391-3-1 Emission Standard for Asbestos (Including Work Practices): 40 CFR Part 61 (NESHAP), Subpart M (asbestos)
  2. GAEPD Chapter 391-3-14
  3. GAEPD Rule 391-3-4-.04(8) Asbestos Containing Waste
- D. The following documents published by the American National Standards Institute:
  1. "Fundamentals Governing the Design and Operation of Local Exhaust Systems," Z9.2-1979.
  2. "American National Standard for Respiratory Protection Respiratory Use - Physical Qualifications for Personnel", Z88.6-1984.
  3. "Practices for Respiratory Protection," Z88.2-1992.

### 1.02 NOTICES

- A. The contractor shall notify the following offices in writing within the time frame specified by the NESHAP regulations prior to beginning any asbestos removal operations.

#### State Agencies

Georgia EPD Online System (GEOS)  
<https://epd.georgia.gov/forms-permits/land-protection-branch-forms-permits/asbestos-licensing-and-notifications>

#### Emergency Departments

Notify the local emergency medical services, police, and fire departments in writing on the type and scope of work being performed and request these department make an inspection prior to beginning work.

#### Licenses

Maintain current licenses for contractor and accreditation for workers and supervisors as required by applicable State or local jurisdictions for the removal, transporting, disposal or other regulated activity relative to the work of this contract. Worker and Supervisor accreditation cards/certificates must be kept on site at all times the Contractor is on the site.

## **SECTION 01410**

### **AIR MONITORING**

#### **1.01 GENERAL**

- A. Project monitoring services will be contracted by the Owner and performed by a third-party Consultant.
- B. Air monitoring (Optional) will be performed by an Air Sampler with AHERA asbestos supervisor and NIOSH 582 equivalent certifications

#### **1.02 DESCRIPTION OF WORK**

- A. At the job site, the Project Monitor shall observe, be aware of, and comment on general work site conditions and activities as they relate to the specifications and profession of industrial hygiene and communicate these observations and comments to the Owner and Contractor on a regular basis.
- B. The Project Monitor is responsible for documenting the protection of the air environment from contamination, protection of persons in adjacent areas, and assurance that air quality relative to asbestos in work areas is acceptable for occupancy in accordance with applicable regulations.
- C. Copies of project monitoring field notes and reports of observations shall be kept in a log maintained by the Project Monitor and available for inspection when required. If collected, PCM air sample results shall be available to the Consultant within 24 hours after collection of samples.
- D. The Project Monitor is to generally conform to the Consultant's schedule and shall respond to necessary changes; provided an advance notice is given as outlined in Section 01043 and that the overall contractual scheduling requirements are met.
- E. At the completion of the project, the Consultant shall prepare a report describing the assessment of the project, all air monitoring data (if collected), acceptance letters, calibration records and a description of the project as it proceeded to completion.

#### **1.03 AIR MONITORING**

This section is at the discretion of the client.

- A. Ambient Air Monitoring: The purpose of ambient air monitoring will be to detect discrepancies in the work area isolation such as:
  - 1. Contamination of the building outside of the work area with airborne asbestos fibers.

## **Asbestos Removal Specifications**

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



2. Failure of filtration or rupture in the negative pressure system.
  3. Confirm the work practices established by the contractor and respiratory protection provided for employees are adequate.
- B. Work Area Airborne Fiber Levels: The Air Sampler will monitor airborne fiber levels in the work area. The purpose of this air monitoring will be to detect airborne fiber levels which may challenge the ability of the work area isolation procedures to protect the balance of the building or outside of the building from contamination by airborne fibers.
- C. Work Area Clearance: To determine if the elevated airborne fiber levels encountered during abatement operations have been reduced to an acceptable level, Air Sampler will sample and analyze air per Section 01714.

### **SECTION 01503**

## **TEMPORARY FACILITIES**

### **1.01 GENERAL**

- A. Provide temporary facilities as required herein or as necessary to carry out the work.
- B. Use qualified tradesmen for installation of temporary services and facilities. Locate, modify and extend temporary services and facilities where they will serve the project adequately and result in minimum interference with the performance of the work.
- C. The Owner shall lock and tag out all electrical and HVAC equipment in the asbestos abatement area. The Contractor shall verify that the power and HVAC have been locked and tagged out prior to beginning work.

### **1.02 WATER SERVICE**

- A. One source of water for construction use will be at the nearest fire hydrant within or adjacent to the work area. An approved backflow prevention device must be supplied by the contractor. If closest fire hydrant is across the street the Contractor shall make proper arrangements for hose or pipe to be driven over during the project. If this is not appropriate the Contractor shall supply a source of water. Contractor bears all expense of heating and getting water to the work and decontamination areas.
- B. Supply hot and cold water to the decontamination unit in accordance with Section 01563. Hot water shall be supplied at a minimum temperature of 100 degrees Fahrenheit.
- C. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment.

## **Asbestos Removal Specifications**

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



### **1.03 ELECTRICAL SERVICE**

- A. General: Contractor is required to supply electricity required for execution of the Project. Contractor shall comply with applicable NEMA, NEC and UL standards and governing state and local regulations for materials and layout of temporary electric service.
- B. Ground Fault Protection: Provide receptacle outlets equipped with ground fault circuit interrupters, reset button and pilot light, for plug-in connection of power tools and equipment.
- C. Provide a weatherproof, grounded temporary electric power service and distribution system of sufficient size, capacity and power characteristics to accommodate performance of work during the construction period.
- D. Where necessary install temporary lighting adequate to provide sufficient illumination for safe work and traffic conditions in every area of work.

### **1.04 FIRST AID**

- A. A minimum of one first aid kit shall be located in the clean room. Additional first aid kits as the contractor feels is adequate or is required by law shall be located throughout the work area.

### **1.05 FIRE EXTINGUISHERS**

- A. Comply with the applicable recommendations of NFPA Standard 10 - "Standard for Portable Fire Extinguishers." Locate fire extinguishers where they are most convenient and effective for their intended purpose but provide not less than one extinguisher in each work area equipment room and one in the clean room of the personnel decontamination unit (If applicable).

### **1.06 TOILET FACILITIES**

- A. Provide temporary toilet facilities to be used by Contractor's employees in a location to be approved by the owner.

### **1.07 PARKING**

- A. Park only in areas designated by the Owner.

### **1.08 BUILDING SECURITY**

- A. Maintain personnel on-site at all times any portion of the work areas are open or not properly secured. Secure work areas completely at the end of each day.

## **Asbestos Removal Specifications**

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



### **1.09 STORAGE**

- A. Supply temporary storage required for storage of equipment and materials for duration of project. Trailer and storage dumpsters will be maintained in areas designated by the Owner.

## **SECTION 01526**

### **WORK AREA PREPARATION**

#### **1.01 GENERAL**

- A. Completely isolate the work area from other parts of the site to prevent contamination beyond the isolated area.
- B. Temporary facilities shall be addressed as outlined in Section 01503.
- C. The Contractor shall set up a work area, load out and decontamination area as shown in the plans and specifications. Any variations must be approved by the designer. The decontamination facility outside of the work area shall consist of a change room, air lock, shower room, air lock and equipment room as described in Section 01563.
- D. The Contractor shall wet clean and/or HEPA vacuum all items and equipment in the work area suspected of being contaminated with asbestos, but not in direct contact with the asbestos material, and either secure these items in place with polyethylene sheeting or have them removed from the work area.
- E. Emergency procedures shall have priority over established decontamination entry and exit procedures.
- F. After work area preparation, the Contractor shall notify the Consultant verbally with written follow-up that he is ready for a pre-work inspection. Asbestos removal shall commence only after satisfactory pre-work inspection has been completed by the Project Monitor.

## **SECTION 01560**

### **WORKER PROTECTION**

#### **1.01 GENERAL**

- A. Provide worker protection as required by OSHA, state, and local standards applicable to the work. Contractor is solely responsible for enforcing worker protection requirements at least equal to those specified in this Section.



## **Asbestos Removal Specifications**

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



- B. Each time the work area is entered the contractor shall require all persons to remove all street clothes in the changing room of the personnel decontamination unit and put on new disposable coverall, new head cover, and a clean respirator. Proceed through shower room to equipment room and put on work boots.
- C. Workers shall not eat, drink, smoke, chew gum or chew tobacco in the work area, the equipment room, the load out area or the clean room.

### **1.02 WORKER TRAINING**

- A. Train all workers in accordance with 29 CFR 1926 and State of Georgia Regulations regarding the dangers inherent in handling asbestos, breathing asbestos dust, proper work procedures and personal and area protective measures.

### **1.03 MEDICAL EXAMINATIONS**

- A. Provide medical examinations for all workers. Examination shall as minimum meet OSHA requirements as set forth in 29 CFR 1926

### **1.04 PROTECTIVE CLOTHING**

- A. Provide disposable full-body coveralls and disposable head covers and require that they be worn by all workers in the work area. Provide a sufficient number for all required changes, for all workers in the work area.
- B. Boots: Provide work boots with non-skid soles and, where required by OSHA, foot protection for all workers.
- C. Gloves: Provide work gloves to all workers and require that they be worn at the appropriate times. Do not remove gloves from work area. Dispose of work gloves as asbestos-contaminated waste, as appropriate, at the completion of the project.

### **1.05 DECONTAMINATION PROCEDURES**

- A. Require that all workers use the following decontamination procedure as a minimum requirement whenever leaving the work area:
  - 1. Remove disposable coveralls, disposable head covers, and disposable footwear covers or boots in the equipment room.
  - 2. Still wearing respirators, proceed to showers. Showering is mandatory. Care must be taken to follow reasonable procedures in removing the respirator to avoid asbestos fibers while showering. The following procedure is required as a minimum:
    - a. Thoroughly wet body including hair and face.

## **Asbestos Removal Specifications**

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



- b. With respirator still in place thoroughly wash body, hair, respirator face piece, and all exterior parts of the respirator.
  - c. Take a deep breath, hold it and/or exhale slowly, completely wet hair, face and respirator. While still holding breath, remove respirator and hold it away from face before starting to breathe.
  - d. Carefully wash face piece of respirator inside and out.
  - e. Shower completely with soap and water; rinse thoroughly.
  - f. Rinse shower room walls and floor prior to exit.
  - g. Proceed from shower to changing (clean) room and change into street clothes or new disposable work items.
3. After showering, each employee shall inspect, clean, and repair his respirator as needed. The respirator shall be dried, placed in a suitable storage bag and properly stored.

## **SECTION 01562**

### **RESPIRATORY PROTECTION**

#### **1.01 DESCRIPTION OF WORK**

- A. Instruct and train each worker involved in asbestos abatement in proper respirator use and require that each worker always wear a respirator, properly fitted on the face, in the work area from the start of any operation which may cause airborne asbestos fibers until the work area is completely decontaminated. Use respiratory protection appropriate for the fiber level encountered in the workplace or as required for other toxic or oxygen-deficient situations encountered.

#### **1.02 GENERAL**

- A. Provide workers with personally issued and marked respiratory equipment approved by NIOSH and suitable for the asbestos exposure level in the work areas according to OSHA Standard 29 CFR 1926.1101 and other possible contaminants employees might be exposed to during the project.
- B. Provide respiratory protection from the time the first operation involved in the project requires contact with asbestos-containing materials (including construction of decontamination units, construction of airtight barriers/barricades, and placing of plastic sheeting on walls) until acceptance of final air clearance test results by the air monitoring firm.

## Asbestos Removal Specifications

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



- C. The minimum respiratory protection for the project during removal of friable asbestos-containing material shall be full-face negative pressure air purifying respirators (PAPR). Minimum respiratory protection during removal of non-friable asbestos-containing materials shall be half-face negative pressure air purifying respirators. Maximum respiratory protection can be lowered based on the Contractor providing a Negative Exposure Assessment (NEA).
- D. Respirator fit testing shall be performed as a minimum at the beginning of the project, at any change in respiratory protection equipment, and at any time during the project if requested by the employee or Project Monitor. Fit testing is to be performed by one of the methods listed in the 29 CFR 1926.1101, Appendix C.

### SECTION 01563

## DECONTAMINATION UNITS

### 1.01 DESCRIPTION OF WORK

The Contractor shall construct or install a prefabricated Worker Decontamination System. The “decon” shall be remote at ground level. This shall consist of a “clean” room intended for privacy of workers when changing before and after showering, and a shower room. Contractor shall comply with 29 CFR 1926.1101, specifically paragraph (j); “Hygiene facilities and practices for employees”.

### 1.02 GENERAL

#### A. Personnel Decontamination Unit

1. Ensure a supply of soap, shampoo, and bath size disposable paper towels are available at all times in the shower room. Both hot and cold running water are required per OSHA regulations.
2. If mixed gender crews are used, only one gender at a time may use facility. Written Contractor SOP for such a situation to ensure privacy and decorum shall be provided to the consultant.

#### B. Equipment Decontamination Units:

1. Provide an equipment decontamination unit consisting of a serial arrangement of rooms (clean room, holding area and washroom) each room separated by a minimum of three curtain doorways, for removal of equipment and material from work area. Do not allow personnel to enter or exit work area through equipment decontamination unit.
2. Washroom: Provide washroom for cleaning of bagged or drummed asbestos-containing waste materials passed from the work area.
3. Holding Area: Provide holding area as a drop location for sealed drums and bagged asbestos-containing materials waste passed from the washroom.

## Asbestos Removal Specifications

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



4. Clean Room: Provide clean room to isolate the holding area from the building exterior or occupied areas.
  5. Equipment or Material: Obtain all equipment or material from the work area through the equipment decontamination unit according to the following procedure:
    - a. When passing contaminated equipment, sealed plastic bags, drums or containers into the washroom, close all doorways of the equipment decontamination unit, other than the doorway between the work area and the washroom. Keep all outside personnel clear of the equipment decontamination unit.
    - b. Once inside the washroom, wet-clean the bags and/or equipment.
    - c. When cleaning is complete, insert bagged material into a clean bag/drum during the pass between the washroom and holding area. Close all doorways except the doorway between the washroom and holding area.
    - d. Workers from the building exterior enter the clean room then the holding area to remove decontaminated equipment and/or containers for disposal. Require these workers to wear full protective clothing and respiratory protection as described in Section 01562.
- C. Decontamination Unit Contamination:
1. If the air quality in the decontamination unit exceeds 0.01 fibers per cubic centimeters of air (f/cc) as analyzed by PCM or 70 structures per squared millimeter (s/mm<sup>2</sup>) as analyzed by TEM or its integrity is diminished through use, as determined by the Designer, no employee shall use the unit until corrective steps are taken and approved by the Designer and Industrial Hygiene Firm.

## SECTION 01711

### PROJECT DECONTAMINATION

#### 1.01 GENERAL

- A. Carry out a first cleaning of all surfaces of the work area including plastic sheeting, tools, scaffolding and/or staging by use of damp-cleaning and mopping and/or a high efficiency particulate air (HEPA) filter vacuum until there is no visible debris from removed materials or residue on plastic sheeting or other surfaces. Do not perform dry-dusting or dry-sweeping.
- B. Equipment shall be cleaned, and all contaminated materials removed.

## **Asbestos Removal Specifications**

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



- C. At the completion of the cleaning operation, the Contractor's supervisor shall perform a complete visual inspection of the work area to ensure that no visible asbestos containing material remains in the work area. If the supervisor believes he is ready for a final project decontamination inspection, he shall notify the Project Monitor.
- D. Final project decontamination inspection includes the visual inspection by Project Monitor conducted in general agreement with the practices in ASTM E1368 and obtaining satisfactory air monitoring clearance by Air Sampler (if applicable)
- E. Visual inspection for acceptance shall be performed after all areas are dry.
- F. If applicable, the project monitor shall conduct the final air clearance. Any discrepancies found shall be documented in the form of a punch list.
- G. Final air sampling, if applicable, shall not commence until the visual inspection by Project Monitor has completed and passed.
- H. If the project monitor finds that the work area has not been adequately decontaminated, cleaning and/or air monitoring shall be repeated at the Contractor's expense, including additional industrial hygiene fees, until the work area is in compliance.
- I. If applicable, after the project monitor has approved the final project decontamination and the Contractor has completed the tear down for occupancy by others, the Project Monitor shall perform the project final inspection as outlined in the general conditions.
- J. Any residual asbestos that may be present which in the Project Monitor's judgment should have been cleaned during the pre-cleaning phase prior to installing critical barriers, shall be cleaned and cleared at the Contractor's expense.

## **SECTION 01714**

### **WORK AREA CLEARANCE**

#### **1.01 GENERAL**

- A. Notification and scheduling of the final inspection during the project is the responsibility of the Contractor.

#### **1.02 FINAL CLEARANCE VISUAL OBSERVATIONS**

- A. After the cleaning operation and after the area is completely dry, the following procedure shall be performed for the work area:
  - 1. A final visual inspection shall be conducted by the Consultant. The inspection shall be conducted following the guidelines set forth in the American Society for Testing and Materials, Standard Practices for Visual Inspection of Asbestos Abatement Projects, Designation: E1368.

## Asbestos Removal Specifications

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



### SECTION 02080

## ASBESTOS REMOVAL

### 1.01 GENERAL

- A. Prior to starting asbestos removal, the Contractor's equipment, work area and decontamination units will be inspected and approved by the Project Monitor.
- B. All loose asbestos material removed in the work area shall be adequately wet and properly labeled before personnel breaks or end of shift.
- C. All plastic sheeting, tape, cleaning material, clothing and all other disposable material or items used in the work area shall be packed into sealable plastic bags (6-mil minimum) and treated as contaminated material.
- D. All such materials shall be double bagged.
- E. All excess water (except shower water) shall be combined with removed material or other absorptive material and properly disposed of as per EPA regulations. Contractor shall not place water in storm drains, onto lawns, or into ditches, creeks, streams, rivers, lakes or oceans.

### 1.02 SCOPE OF WORK

- A. The scope of work for this project shall consist of the removal and disposal of previously identified asbestos containing materials. Materials scheduled for abatement include:
  - Black Mastic Under Carpet from Concrete Flooring (Main Office)
  - Black Sink Undercoat
  - Textured Ceiling
  - Wallboard and Joint Compound (WB/JC)
  - Brown/Black Exterior Door Caulk
  - Popcorn Ceiling
  - Exterior Black and Pink Door Caulk
  - Exterior Black and Pink Window Caulk
- B. Materials to be abated are identified in asbestos survey reports (**Hazardous Materials Inspection Report dated November 12, 2024, HN247281A**) on file with the Owner.
- C. All asbestos work as defined herein shall be performed using appropriate means and methods to minimize fiber releases during ACM abatement.



## **Asbestos Removal Specifications**

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



### **1.03 REMOVAL OF ASBESTOS-CONTAINING MATERIAL**

#### **Black Mastic - Class II Category I Non- Friable**

##### **Removal**

ACM to be abated under these specifications include areas of black mastic under carpet.

- Sufficiently wet flooring material covering concrete flooring, remove by best method available. Be aware of limiting water use/quantity and collecting quickly to avoid any leakage into crawl space or other rooms.
- Once the carpet is fully removed, wet floor areas for removal, again carefully monitoring water use. The Abatement Contractor will proceed with floor removal using hand tools. The Abatement Contractor must provide all persons in the work area (at a minimum) with half-face, negative pressure respirators equipped with HEPA filter cartridges. As required in the OSHA Asbestos Construction Standard, the Abatement Contractor will provide a Powered Air Purifying Respirator to any worker who requests one.
- All loose carpeting and backing shall be collected and placed in double 6-mil plastic or plastic reinforced bags or in barrels lined with 6 mil. plastic bags for transport from the work area and to the landfill.
- Once mastic has been removed from a work area, apply a penetrating encapsulant or a fiber lockdown shall be used from the area of flooring removal.

#### **Drywall joint compound, textured ceiling and popcorn ceiling coat removal- Regulated Asbestos Containing Material (RACM)**

##### **Removal**

Abatement removal procedures for ACM joint compound/drywall shall include:

- Install critical barriers in affected rooms.
- Place work area under negative pressure.
- Wet down until thoroughly wetted.
- Remove ALL drywall in the effected rooms, including around nails, being sure to remove all joint compound, ceiling texture and popcorn ceiling coat.
- Fully wrap and seal in 6 mil. polyethylene sheeting, properly labeled.
- Dispose of as asbestos waste in an approved landfill.
- Clean floors and all accessible surfaces of dust and debris.

## Asbestos Removal Specifications

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



Apply a penetrating encapsulant to all exposed studs and surfaces

### Door and Window Caulk- Class II Category II Non-Friable

#### Removal

The following guidance follows the OSHA 1926.1101 Asbestos Construction Standard for removal of exterior caulks and components.

- The ACM window/door caulking is to be thoroughly wetted with amended water, and the material carefully scraped away using suitable razor or other sharp devices for the purpose, collected, and disposed of properly. Protect intact windows and doors from breakage to the extent possible, or as directed by the General Contractor. This is to be done on the interior and exterior as observed. Alternatively, remove window/door component and dispose as ACM.

### Black sink undercoating Abatement - Class II Category I Non-Friable

#### Removal

- The entire sink unit should be removed in an intact state and placed in 6-mil poly for disposal.
- Thoroughly wet the sink underside with amended water (water with a surfactant) before and during removal to minimize fiber release.
- Fully wrap and seal in 6 mil. polyethylene sheeting, properly labeled.
- When mechanical equipment will be used, they shall be continuously misted with water and the equipment shall be equipped with a HEPA attachment. Any dust seen shall be HEPA vacuumed or wet-wiped and collected for proper disposal.

The above procedure shall be repeated for each identified area with ACM as described to be removed.

## SECTION 02084

### DISPOSAL OF ASBESTOS-CONTAINING WASTE MATERIAL

#### 1.01 GENERAL

- A. All asbestos materials and miscellaneous contaminated debris shall be properly sealed and protected, and the load out vehicle/dumpster shall be locked while located on the project site and then transported to a pre-designated disposal site in accordance with 40 CFR 61.150 and DOT 49 CFR Parts 100-399.
- B. An enclosed vehicle will be used to haul waste material to the disposal site. No rental vehicles or trailers shall be used. Vehicle selection, vehicle covers, and work practices shall assure that no asbestos becomes airborne during the loading, transport and

## Asbestos Removal Specifications

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



unloading activity, and that material is placed in the waste site without breaking any seals.

- C. Waste Removal from Roof – Sealed double bags of ACM waste may be removed to ground level by use of a chute with sufficiently smooth siding that the bags will not be damaged or breached. Alternately, they may be removed to ground level by other means suitable for the purpose. However, in no case may the bags be dropped from higher level to the ground.
- D. Double waste disposal polyethylene bags (6 mil), non-porous (steel/plastic) drums or equivalent, with labels, appropriate for storing asbestos waste during transportation to the disposal site shall be used. In addition to the OSHA labeling requirements, all containers shall be labeled with the name of the waste generator and the location where the waste was generated.
- E. The Contractor shall transport the containers of waste material to the approved waste disposal site.
- F. Workers loading and unloading the asbestos will wear respirators and disposable clothing when handling material. Asbestos warning signs shall be posted during loading and unloading of asbestos waste.
- G. The contractor shall use the Waste Shipment Record for disposal records as per 40 CFR 61.150 and distribute a copy of all waste shipment records to the GAEPD and the Designer after the completion of the project.

## **Asbestos Removal Specifications**

Willow Branch Apartments,  
822 North Indian Creek Drive | Clarkston, Georgia  
November 3, 2025 | Terracon Project HN257348



## Appendix

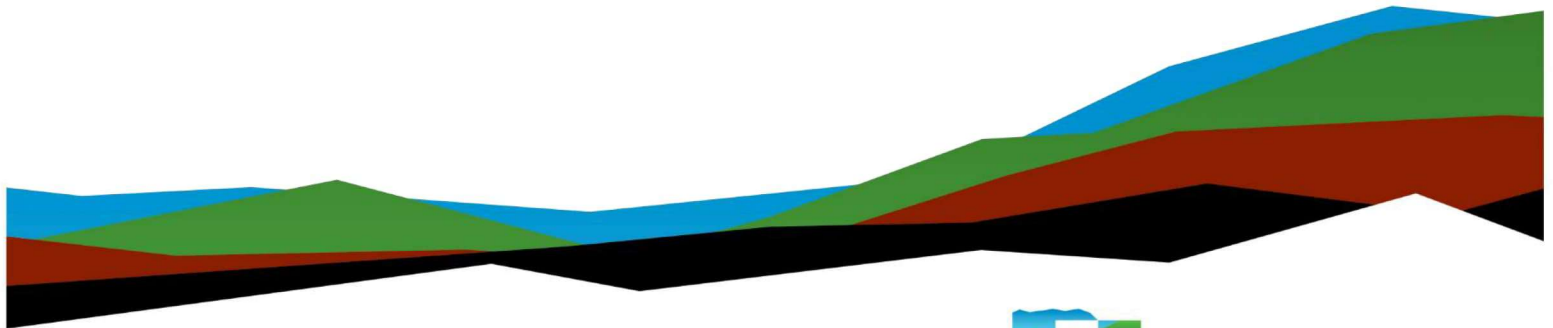
# Hazardous Materials Inspection Report

Willow Branch Apartments  
822 North Indian Creek Drive  
Clarkston, Georgia 30021

Terracon Project Number HN247281A  
November 12, 2024

**Prepared for:**

Zimmerman Properties, LLC.  
1329 E Lark St  
Springfield, Missouri 65804



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514 Hillcrest Industrial Boulevard  
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P (478) 757-1606  
**Terracon.com**

November 12, 2024

Zimmerman Properties, LLC.  
1329 E Lark St  
Springfield, Missouri 65804

Attn: Mr. Vaughn Zimmerman  
(417) 883-1632  
vzimmerman@wilhoitproperties.com

**Re: Hazardous Materials Inspection Report**  
Willow Branch Apartments  
822 North Indian Creek Drive  
Clarkston, Georgia 30021  
**Terracon Project No.: HN247281A**

Dear Mr. Zimmerman,

Terracon Consultants, Inc. (Terracon) is pleased to submit the attached hazardous materials inspection report for the Willow Branch Apartments, located at 822 North Indian Creek Drive, Clarkston, Georgia, to Zimmerman Properties, LLC. The purpose of this report is to present the results of a hazardous materials inspection performed on October 7th and 8th, 2024. We understand that this inspection was requested due to the planned renovation of the above-referenced structures.

Sincerely,  
**Terracon Consultants, Inc.**

A handwritten signature in black ink, appearing to read "TK Peterman".

Todd K. Peterman  
Project Manager  
Asbestos Inspector/MP#19878

A handwritten signature in blue ink, appearing to read "Tameka Gordon".

Tameka Gordon  
Environmental Department Manager  
Senior Associate

A handwritten signature in black ink, appearing to read "David Baird".

David Baird  
Field Geologist  
Asbestos Inspector #5807



## Table of Contents

|            |                                             |          |
|------------|---------------------------------------------|----------|
| <b>1.0</b> | <b>INTRODUCTION .....</b>                   | <b>1</b> |
| <b>2.0</b> | <b>SITE AND BUILDING DESCRIPTIONS .....</b> | <b>1</b> |
| <b>3.0</b> | <b>FIELD ACTIVITIES .....</b>               | <b>2</b> |
| 3.1        | Asbestos Inspection.....                    | 2        |
| 3.2        | Lead (Pb) in Soil Procedure.....            | 3        |
| 3.3        | Lead (Pb) in Water Procedure.....           | 4        |
| <b>4.0</b> | <b>REGULATORY OVERVIEW .....</b>            | <b>4</b> |
| 4.1        | Asbestos Regulatory Overview .....          | 4        |
| 4.2        | Lead Paint Regulatory Overview .....        | 5        |
| <b>5.0</b> | <b>FINDINGS AND RECOMMENDATIONS.....</b>    | <b>6</b> |
| 5.1        | Asbestos Inspection.....                    | 6        |
| 5.2        | Lead in Soil Results .....                  | 6        |
| 5.3        | Lead in Drinking Water Results.....         | 8        |
| <b>6.0</b> | <b>GENERAL COMMENTS .....</b>               | <b>9</b> |

## Appendices

|            |                                                                                 |
|------------|---------------------------------------------------------------------------------|
| APPENDIX A | Identified and Assumed Asbestos-Containing Materials                            |
| APPENDIX B | Asbestos Inspection Sample Summary                                              |
| APPENDIX C | Asbestos, Pb in Soil, and Pb in Drinking Water Analytical<br>Laboratory Reports |
| APPENDIX D | Photographic Documentation and Drawing                                          |
| APPENDIX E | Inspector Credentials                                                           |
| APPENDIX F | Pb in Soil Drawings                                                             |

## 1.0 Introduction

Terracon Consultants, Inc. (Terracon) conducted a hazardous materials inspection of the Willow Branch Apartments, located at 822 North Indian Creek Drive, Clarkston, Georgia. The inspection was conducted on October 7, and 8, 2024, by Asbestos Hazard Emergency Response Act (AHERA) certified Asbestos Inspectors Patrick Daniel and David Baird in general accordance with the sampling protocols established in the United States Environmental Protection Agency (USEPA) 40 CFR Part 763, Subpart E, known as AHERA.

### Project Objective

Terracon understands this hazardous materials inspection was requested in support of the planned renovation of the on-site structures and equipment to satisfy requirements of the USEPA 40 CFR Part 61, Subpart M, the National Emission Standards for Hazardous Air Pollutants (NESHAP). Terracon also understands that the intent of the assessment is to assist the client with communicating the presence, location, and quantity of asbestos-containing materials (ACMs), lead in soil around each structures employees, vendors, and contractors working in the structures in order to meet the requirements of the Occupational Safety and Health Administration (OSHA) communication of hazard requirements found at 29 CFR 1926.1101.

### Reliance

This report is for the exclusive use of the Zimmerman Properties, LLC, for the project being discussed. Reliance by any other party on this report is prohibited without written authorization of Terracon and the Zimmerman Properties, LLC. Reliance on this report by the Zimmerman Properties, LLC, and all authorized parties will be subject to the terms, conditions, and limitations stated in the proposal, this report, and Terracon's Agreement for Services. The limitations of liability defined in Terracon's Agreement for Services is the aggregate limit of Terracon's liability to Zimmerman Properties, LLC.

## 2.0 Site and Building Descriptions

The subject project is comprised of 15 separate structures, all apartment buildings. The structures are constructed of a brick and concrete masonry unit (CMU) block. The hazardous materials inspection encompassed the interior and exterior of the structures. The exterior of the buildings is comprised of brick walls, with asphalt shingle roofing.

## 3.0 Field Activities

### 3.1 Asbestos Inspection

The asbestos inspection was conducted by Mr. Patrick Daniel and Mr. David Baird, both AHERA accredited asbestos inspectors. A copy of the asbestos inspectors' credentials is attached as Appendix E. The sampling was conducted in general accordance with the sample collection protocols established in EPA regulation 40 CFR 763 (AHERA). A summary of inspection activities is provided below.

#### 3.1.1 Visual Assessment

Terracon's inspection activities began with visual observation of the interior and exterior of the structures to identify homogeneous areas of suspect ACM. A homogeneous area consists of building materials that appear similar throughout in terms of color, texture, and date of application. The assessment was conducted throughout visually accessible areas of the structures. Building materials identified as glass, wood, metal, or rubber were not considered suspect ACM.

#### 3.1.2 Physical Assessment

A physical assessment of each homogeneous area of new suspect ACM was conducted to assess the friability and condition of the material. A friable material is defined by the EPA as a material which can be crumbled, pulverized, or reduced to powder by hand pressure when dry. Friability was assessed by physically touching suspect materials.

#### 3.1.3 Sample Collection

Based on results of the visual observation, 100 bulk samples of suspect ACM were collected in general accordance with AHERA sampling protocols. Random samples of suspect materials were collected in each homogeneous area. Bulk samples were collected using wet methods, as applicable, to reduce the potential for fiber release. Samples were placed in sealable containers and labeled with unique sample numbers using an indelible marker.

100 total bulk samples were collected from 13 homogeneous areas of suspect ACM. A summary of suspect ACM samples collected during the inspection is included as Appendix B.

#### 3.1.4 Sample Analysis

Bulk samples were submitted under chain of custody to Eurofins Testing Southeast, LLC. (Eurofins) in Atlanta, Georgia for analysis by polarized light microscopy (PLM) with dispersion staining techniques per EPA methodology (EPA Method 600/R-93/116). The

percentage of asbestos applicable was determined by microscopic visual estimation. Eurofins is accredited under the National Voluntary Laboratory Accreditation Program (NVLAP Accreditation No.: 102082-0).

During the analysis, the laboratory attempted to further separate individual layers from the materials submitted. Eighty-nine (89) additional layers were separated by the laboratory resulting in a total of one hundred eighty-nine (189) analyzed samples.

### **3.2 Lead (Pb) in Soil Procedure**

In conjunction with the asbestos inspection, Terracon collected soil samples as noted below for analytical testing for total lead. Terracon sampled soil at the perimeter of the buildings. All Samples were collected from approximately 5/8 inch below ground surface (bgs.). Soil samples collected from the buildings were submitted for laboratory analysis for total lead.

The following soil sampling procedures were used during the soil sampling performed for this assessment:

- Wearing clean disposable nitrile gloves, Terracon staff sampled the area of soil within one foot of the edge of the exterior, or the drip line, of the structure.
- Soil samples were collected using a 5-cc disposable syringe with a clean syringe used for discrete samples, or soil probe.
- Composite samples of 3 to 10 aliquots were collected, spaced approximately 6 ft. apart; Note: If play areas are observed they will need to be sampled separately from the buildings.
- Each composite sample was mixed to achieve a representative sample of the total area.
- The top 5/8 inch of bare soil was sampled; (delineation samples were taken in case the dripline samples were above the GA HSRA-NC.
- Samples were given unique identification numbers coinciding with a location on the field sketch for the respective location.
- Samples were collected and submitted to an accredited analytical laboratory, Eurofins in Atlanta, Georgia under chain of custody protocol.

Following collection, the samples were delivered, via carrier under proper chain of custody documentation, to Eurofins. Eurofins is accredited by the American Industrial Hygiene

Association Laboratory Accreditation Program (AIHA-LAP, LLC) for the analysis of environmental lead.

### **3.3 Lead (Pb) in Water Procedure**

Terracon will collect “first draw” water samples from drinking water fixtures in a minimum of 10 percent of the total units or one from each building, whatever is greater (kitchen faucets). A first draw sample is identified as the first water to come out of the tap after an 8-hour period of no activity, but no more than 18 hours after the last activity. A “second draw” of water will be taken after five minutes of continuously running the faucet after the first draw. Samples will be collected in laboratory-supplied 250-ml bottles preserved with Nitric Acid (HNO<sub>3</sub>).

## **4.0 Regulatory Overview**

### **4.1 Asbestos Regulatory Overview**

The asbestos NESHAP (40 CFR Part 61, Subpart M) regulates asbestos fiber emissions and asbestos waste disposal practices. It also requires the identification and classification of existing building materials prior to demolition or renovation activity. Under NESHAP, asbestos-containing building materials are classified as either friable, Category I non-friable or Category II non-friable ACM. Friable materials are those that, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure. Category I non-friable ACM includes packings, gaskets, resilient floor coverings and asphalt roofing products containing more than 1% asbestos. Category II non-friable ACM are any materials other than Category I materials that contain more than 1% asbestos.

Friable ACM, Category I and Category II non-friable ACM which is in poor condition and has become friable or which will be subjected to drilling, sanding, grinding, cutting, or abrading and which could be crushed or pulverized during anticipated renovation or demolition activities are considered regulated ACM (RACM). RACM must be removed prior to renovation or demolition activities which will disturb the materials. If the amount of RACM exceeds 10 linear feet or 10 square feet, the owner or operator must provide the State of Georgia Environmental Protection Division (EPD) with written notification of planned removal activities at least 10 working days prior to the commencement of asbestos abatement activities. Removal of RACM must be conducted by an appropriately accredited and licensed asbestos abatement contractor. Please note that in the State of Georgia for any demolition project a 10-day notice is required regardless of the ACM content within the structure.

The OSHA Asbestos standard for construction (29 CFR 1926.1101) regulates workplace exposure to asbestos. The OSHA standard requires that employee exposure to airborne

asbestos fibers be maintained below 0.1 asbestos fibers per cubic centimeter of air (0.1 f/cc as an eight-hour time weighted average). The OSHA standard classifies construction and maintenance activities which could disturb ACM and specifies work practices and precautions which employers must follow when engaging in each class of regulated work.

## **4.2 Lead Paint Regulatory Overview**

The Resource Conservation and Recovery Act (RCRA) gave the USEPA authority to regulate the waste status of demolition or renovation debris, including lead-containing materials. Specific notification and testing requirements must be addressed prior to transporting, treating, storing, or disposing of hazardous wastes. Lead containing wastes are considered hazardous waste under RCRA if Toxicity Characteristic Leaching Procedure (TCLP) results exceed 5 milligrams per liter (mg/L). EPA exempts from most RCRA requirements those generators whose combined hazardous waste generation is less than 100 kilograms (kg) per month.

Detectable lead quantities may constitute a lead dust hazard during renovation and demolition activities. Personnel performing renovation and demolition activities that may disturb painted components with concentrations of lead above the designated analytical detection limit should comply with all current OSHA regulations in order to minimize employee exposure. OSHA defines lead paint as a paint, which contains lead, regardless of the concentration. Currently, any proposed renovation or demolition is subject to the OSHA regulations (29 CFR 1926.62 – Lead Exposure in Construction). The OSHA regulation defines specific training requirements, engineering controls and working practices for construction personnel subject to this standard. Occupational exposure to lead occurring in the course of construction work, including maintenance activities, painting, alteration, and repairs is subject to the OSHA “Interim” Lead Exposure in Construction standard.

Construction work covered by 29 CFR 1926.62 includes any repair or renovation activities or other activities that disturb in-place lead-containing materials but does not include routine cleaning and repainting where there is insignificant damage, wear, or corrosion of existing lead-containing coatings or substrates. Employers must assure that no employee will be exposed to lead at concentrations greater than 50 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) averaged over an eight-hour period without adequate protection. The OSHA Standard also establishes an action level of 30  $\mu\text{g}/\text{m}^3$  which, if exceeded, triggers the requirement for medical monitoring.

The above overview is not intended to be inclusive of all potentially pertinent regulatory information. The relevant EPA and OSHA standards should be consulted prior to undertaking activities involving the demolition, renovation, or maintenance of surfaces coated with lead paints.



## 5.0 Findings and Recommendations

### 5.1 Asbestos Inspection

Based on the results of the suspect ACM sample collection, as well as laboratory analysis of the suspect materials samples collected from the Willow Branch Apartments, located at 822 North Indian Creek Drive, Clarkston, Georgia, **asbestos was indicated** in the following sampled suspect materials:

- Black Mastic Under Carpet from Concrete Flooring (Main Office)
- Black Sink Undercoat
- Textured Ceiling
- Wallboard and Joint Compound (WB/JC)
- Brown/Black Exterior Door Caulk
- Popcorn Ceiling
- Exterior Black and Pink Door Caulk
- Exterior Black and Pink Window Caulk

#### 5.1.1 Recommendations

Terracon recommends that the identified asbestos be abated by a State licensed asbestos abatement contractor prior to the scheduled renovation of buildings.

Please note that suspect materials, other than those identified during the inspection, may exist within the structures. Should suspect materials other than those which were identified during this inspection be uncovered during renovation activities, those materials should be assumed asbestos-containing until sampling and analysis can confirm or deny their asbestos content.

The laboratory analytical report and the chain of custody are included in Appendix C. Photographs of the structure is included in Appendix D.

### 5.2 Lead in Soil Results

Based on the laboratory analysis of the lead in soil, located at Willow Branch Apartments, Atlanta, Georgia, **no areas** indicate concentrations of lead in excess of (400mg/Kg) by the Georgia Hazardous Site Response Act - (391-3-19) Notification Concentration (HSRA-NC)

**Hazardous Materials Inspection Report**

Willow Branch Apartments | Clarkston, Georgia

November 12, 2024 | Terracon Project Number HN247281A

**Lead in Soil Results**

| Building/Sample ID | Date & Sample Time | Pb Results (mg/Kg) | Location |
|--------------------|--------------------|--------------------|----------|
| WBAG / A-1S        | 10/07/24 – 10:04   | 54                 | Side A   |
| WBAG / A2-S        | 10/07/24 – 10:48   | 30                 | Side A2  |
| WBAG / B-1S        | 10/07/24 – 10:53   | 23                 | Side B   |
| WBAG / D-1S        | 10/07/24 – 10:57   | 23                 | Side D   |

| Building/Sample ID | Date & Sample Time | Pb Results (mg/Kg) | Location |
|--------------------|--------------------|--------------------|----------|
| WBAP / A-1S        | 10/07/24 – 10:22   | 20                 | Side A   |
| WBAP / A-2S        | 10/07/24 – 10:26   | 19                 | Side A2  |
| WBAP / A-3S        | 10/07/24 – 10:28   | 27                 | Side A3  |
| WBAP / B-1S        | 10/07/24 – 10:57   | 42                 | Side B1  |
| WBAP / C-1S        | 10/07/24 – 10:53   | 29                 | Side C1  |
| WBAP / C-2S        | 10/07/24 – 10:48   | 15                 | Side C2  |
| WBAP / C-3S        | 10/07/24 – 10:45   | 37                 | Side C3  |
| WBAP / D-1S        | 10/07/24 – 10:33   | 18                 | Side D   |

| Building/Sample ID | Date & Sample Time | Pb Results (mg/Kg) | Location |
|--------------------|--------------------|--------------------|----------|
| WBAN / A-1S        | 10/07/24 – 11:10   | 17                 | Side A   |
| WBAN / A-2S        | 10/07/24 – 11:14   | 17                 | Side A2  |
| WBAN / B-1S        | 10/07/24 – 11:06   | 42                 | Side B   |
| WBAN / D-1S        | 10/07/24 – 11:17   | 23                 | Side D   |

| Building/Sample ID | Date & Sample Time | Pb Results (mg/Kg) | Location |
|--------------------|--------------------|--------------------|----------|
| WBAM / A-1S        | 10/07/24 – 11:33   | 180                | Side A   |
| WBAM / B-1S        | 10/07/24 – 11:24   | 22                 | Side B   |
| WBAM / C-1S        | 10/07/24 – 11:27   | 18                 | Side C   |
| WBAM / D-1S        | 10/07/24 – 11:30   | 20                 | Side D   |

| Building/Sample ID | Date & Sample Time | Pb Results (mg/Kg) | Location |
|--------------------|--------------------|--------------------|----------|
| WBAL / A-1S        | 10/07/24 – 13:32   | 22                 | Side A   |
| WBAL / A-2S        | 10/07/24 – 13:28   | 24                 | Side A2  |
| WBAL / B-1S        | 10/07/24 – 13:25   | 18                 | Side B   |
| WBAL / D-1S        | 10/07/24 – 13:35   | 18                 | Side D   |

| Building/Sample ID | Date & Sample Time | Pb Results (mg/Kg) | Location |
|--------------------|--------------------|--------------------|----------|
| WBAK / A-1S        | 10/07/24 – 13:54   | 22                 | Side A   |
| WBAK / A-2S        | 10/07/24 – 13:57   | 21                 | Side A2  |
| WBAK / B-1S        | 10/07/24 – 13:40   | 28                 | Side B   |
| WBAK / C-1S        | 10/07/24 – 13:44   | 23                 | Side C   |
| WBAK / C-2S        | 10/07/24 – 13:47   | 29                 | Side C2  |
| WBAK / D-1S        | 10/07/24 – 13:50   | 24                 | Side D   |

## Hazardous Materials Inspection Report

Willow Branch Apartments | Clarkston, Georgia

November 12, 2024 | Terracon Project Number HN247281A



| Building/Sample ID | Date & Sample Time | Pb Results (mg/Kg) | Location |
|--------------------|--------------------|--------------------|----------|
| WBAH / A-1S        | 10/07/24 – 14:19   | 36                 | Side A   |
| WBAH / A-2S        | 10/07/24 – 14:22   | 33                 | Side A2  |
| WBAH / B-1S        | 10/07/24 – 14:08   | 16                 | Side B   |
| WBAH / C-1S        | 10/07/24 – 14:12   | 19                 | Side C   |
| WBAH / D-1S        | 10/07/24 – 14:15   | 36                 | Side D   |

| Building/Sample ID | Date & Sample Time | Pb Results (mg/Kg) | Location |
|--------------------|--------------------|--------------------|----------|
| WBAJ / A-1S        | 10/07/24 – 14:52   | 10                 | Side A   |
| WBAJ / B-1S        | 10/07/24 – 14:56   | 17                 | Side B   |
| WBAJ / C-1S        | 10/07/24 – 15:00   | 35                 | Side C   |
| WBAJ / D-1S        | 10/07/24 – 15:04   | 26                 | Side D   |

The Lead in Soil analysis report is included in Appendix C.

### 5.3 Lead in Drinking Water Results

Based on the laboratory analysis of the lead in drinking water, located at Willow Branch Apartments, Atlanta, Georgia, indicate concentrations of lead in excess of the EPA drinking water thresholds in multiple 1st flush testing results. When tested during the 2nd flush samples, all were reported to be below the EPA standards of 15 PPB.

#### Lead in Drinking Water Results

| Sample ID                 | Date & Sample Time | Pb Results (ug/L) | Location |
|---------------------------|--------------------|-------------------|----------|
| H14 1 <sup>st</sup> Flush | 10/08/24 10:30     | <b>47</b>         | Apt. H14 |
| H14 2 <sup>nd</sup> Flush | 10/08/24 10:35     | Non-Detect        | Apt. H14 |
| L1 1 <sup>st</sup> Flush  | 10/08/24 10:48     | Non-Detect        | Apt. L1  |
| L1 2 <sup>nd</sup> Flush  | 10/08/24 10:53     | Non-Detect        | Apt. L1  |
| L4 1 <sup>st</sup> Flush  | 10/08/24 11:24     | Non-Detect        | Apt. L4  |
| L4 2 <sup>nd</sup> Flush  | 10/08/24 11:29     | Non-Detect        | Apt. L4  |
| K16 1 <sup>st</sup> Flush | 10/08/24 13:10     | Non-Detect        | Apt. K16 |
| K16 2 <sup>nd</sup> Flush | 10/08/24 13:15     | Non-Detect        | Apt. K16 |
| K3 1 <sup>st</sup> Flush  | 10/08/24 13:25     | Non-Detect        | Apt. K3  |
| K3 2 <sup>nd</sup> Flush  | 10/08/24 13:30     | Non-Detect        | Apt. K3  |
| J4 1 <sup>st</sup> Flush  | 10/08/24 13:42     | Non-Detect        | Apt. J4  |
| J4 2 <sup>nd</sup> Flush  | 10/08/24 13:47     | Non-Detect        | Apt. J4  |
| E7 1 <sup>st</sup> Flush  | 10/08/24 14:14     | Non-Detect        | Apt. E7  |
| E7 2 <sup>nd</sup> Flush  | 10/08/24 14:19     | Non-Detect        | Apt. E7  |
| P6 1 <sup>st</sup> Flush  | 10/08/24 14:22     | Non-Detect        | Apt. P6  |
| P6 2 <sup>nd</sup> Flush  | 10/08/24 14:27     | Non-Detect        | Apt. P6  |

## Hazardous Materials Inspection Report

Willow Branch Apartments | Clarkston, Georgia

November 12, 2024 | Terracon Project Number HN247281A



| Sample ID                    | Date & Sample Time | Pb Results (ug/L) | Location |
|------------------------------|--------------------|-------------------|----------|
| G6 1 <sup>st</sup> Flush     | 10/08/24 14:49     | Non-Detect        | Apt. G6  |
| G6 2 <sup>nd</sup> Flush     | 10/08/24 14:54     | Non-Detect        | Apt. G6  |
| Office 1 <sup>st</sup> Flush | 10/08/24 15:15     | Non-Detect        | Office   |
| Office 2 <sup>nd</sup> Flush | 10/08/24 15:20     | Non-Detect        | Office   |
| F2 1 <sup>st</sup> Flush     | 10/15/24 9:21      | Non-Detect        | Apt. F2  |
| F2 2 <sup>nd</sup> Flush     | 10/15/24 9:26      | Non-Detect        | Apt. F2  |
| D2 1 <sup>st</sup> Flush     | 10/15/24 9:43      | Non-Detect        | Apt. D2  |
| D2 2 <sup>nd</sup> Flush     | 10/15/24 9:48      | Non-Detect        | Apt. D2  |
| D4 1 <sup>st</sup> Flush     | 10/15/24 9:58      | Non-Detect        | Apt. D4  |
| D4 2 <sup>nd</sup> Flush     | 10/15/24 10:03     | Non-Detect        | Apt. D4  |
| C6 1 <sup>st</sup> Flush     | 10/15/24 10:17     | 19                | Apt. C6  |
| C6 2 <sup>nd</sup> Flush     | 10/15/24 10:22     | 1.3               | Apt. C6  |
| A2 1 <sup>st</sup> Flush     | 10/15/24 10:40     | Non-Detect        | Apt. A2  |
| A2 2 <sup>nd</sup> Flush     | 10/15/24 10:45     | Non-Detect        | Apt. A2  |
| B18 1 <sup>st</sup> Flush    | 10/15/24 10:59     | Non-Detect        | Apt. B18 |
| B18 2 <sup>nd</sup> Flush    | 10/15/24 11:04     | Non-Detect        | Apt. B18 |
| B2 1 <sup>st</sup> Flush     | 10/15/24 11:18     | Non-Detect        | Apt. B2  |
| B2 2 <sup>nd</sup> Flush     | 10/15/24 11:23     | Non-Detect        | Apt. B2  |
| A4 1 <sup>st</sup> Flush     | 10/15/24 11:35     | Non-Detect        | Apt. A4  |
| A4 2 <sup>nd</sup> Flush     | 10/15/24 11:40     | Non-Detect        | Apt. A4  |
| P19 1 <sup>st</sup> Flush    | 10/15/24 11:50     | Non-Detect        | Apt. P19 |
| P19 2 <sup>nd</sup> Flush    | 10/15/24 11:55     | Non-Detect        | Apt. P19 |

The Lead in drinking water analysis report is included in Appendix C.

## 6.0 General Comments

This hazardous materials inspection was conducted in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing under similar conditions in the same locale. The results, findings, conclusions, and recommendations expressed in this report are based on conditions observed during our inspection of the structures. The information contained in this report is relevant to the dates on which this inspection was performed and should not be relied upon to represent conditions at a later date. This report has been prepared on behalf of and exclusively for use by Zimmerman Properties, LLC for specific application to their project as discussed. This report is not a bidding document. Contractors or consultants reviewing this report must draw their own conclusions regarding further investigation or remediation deemed necessary. Terracon does not warrant the work of regulatory agencies, laboratories or other third parties supplying information which may have been used in the preparation of this report. No warranty, express or implied is made.

## APPENDIX A

### IDENTIFIED ASBESTOS-CONTAINING MATERIAL WILLOW BRANCH APARTMENTS 822 NORTH INDIAN CREEK DRIVE CLARKSTON, GEORGIA TERRACON PROJECT NO.: HN247281A

| Willow Branch Apartments |                                                       |                                                                                    |                       |                       |           |                                    |
|--------------------------|-------------------------------------------------------|------------------------------------------------------------------------------------|-----------------------|-----------------------|-----------|------------------------------------|
| HA                       | Description                                           | Material Location                                                                  | Percent/Type Asbestos | NESHAP Classification | Condition | Estimated Quantity*                |
| 9                        | Black Sink Undercoat                                  | Bldgs. M-3, M-17, H-28                                                             | 5% C                  | CAT I                 | Good      | 465 SF                             |
| 2                        | Textured Ceiling                                      | Bldgs. M-3, M-5, M-14, M-17, M-20, P-12, P-9, P-15, P-5, H-28, L-4, K-16, K-3, P-6 | 2% C                  | RACM                  | Good      | 37,500 SF                          |
| 1                        | Wallboard and Joint Compound (WB/JC)                  | Bldgs. M-5, M-17, M-20, P-12, P-9, P-15, P-5, H-28, H-14, L-4, K-16, K-3, J-1, P-6 | 2% C                  | RACM                  | Good      | 311,000 SF                         |
| 10                       | Brown/Black/Pink Exterior Door Caulk                  | Bldg. P-12, L-1                                                                    | 2-3% C                | CAT II                | Good      | Includes all Units                 |
| 12                       | Popcorn Ceiling                                       | Bldg. H-14, G-6                                                                    | 2% C                  | RACM                  | Good      | *See above SF for Textured Ceiling |
| 3                        | Window Caulk                                          | Bldgs. L-1                                                                         | 2% C                  | CAT II                | Good      | 3,200 LF                           |
| 13                       | Black Mastic Under Carpet on top of Concrete Flooring | Main Office Building                                                               | 5% C                  | CAT I                 | Good      | 1,000 SF                           |

**HA** = Homogenous area, **C** = Chrysotile Asbestos, **CR** = Crocidolite, **SF** = Square feet, **LF** = Linear Feet

\* Quantities are estimates and should be verified by the asbestos abatement contractor

**Friable** materials are those that, when dry, may be crumbled, pulverized, or reduced to powder by hand pressure.

**Category I** non-friable ACM includes packings, gaskets, resilient floor coverings and asphalt roofing products containing more than 1% asbestos.

**Category II** non-friable ACM are any materials other than Category I materials that contain more than 1% asbestos.

**RACM** Includes friable ACM, category I nonfriable ACM that has become friable, Category I nonfriable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or category II nonfriable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material during demolition or renovation operations.

**Hazardous Materials Inspection Report**

Willow Branch Apartments | Clarkston, Georgia

November 12, 2024 | Terracon Project Number HN247281A

**APPENDIX B**

**ASBESTOS INSPECTION SAMPLE SUMMARY  
WILLOW BRANCH APARTMENTS  
822 NORTH INDIAN CREEK DRIVE  
CLARKSTON, GEORGIA  
TERRACON PROJECT NO.: HN247281A**

| Willow Branch Apartments |            |                          |                                  |                  |
|--------------------------|------------|--------------------------|----------------------------------|------------------|
| HA                       | Sample No. | Description              | Sample Location                  | Asbestos Content |
| 1                        | 1-WB3-2    | WALLBOARD/JOINT COMPOUND | MAIN OFFICE                      | ND               |
|                          | 1-WB3-3    | WALLBOARD/JOINT COMPOUND | MAIN OFFICE                      | ND               |
|                          | 1-WB3-10   | WALLBOARD/JOINT COMPOUND | LIVING ROOM (M-4)                | ND               |
|                          | 1-WB3-11   | WALLBOARD/JOINT COMPOUND | EXTERIOR WALL<br>STAIRWELL (M-4) | ND               |
|                          | 1-WB3-13   | WALLBOARD/JOINT COMPOUND | HALLWAY (M-3)                    | ND               |
|                          | 1-WB3-19   | WALLBOARD/JOINT COMPOUND | HALLWAY (M-5)                    | 2% C             |
|                          | 1-WB3-22   | WALLBOARD/JOINT COMPOUND | HALLWAY (M-14)                   | ND               |
|                          | 1-WB3-26   | WALLBOARD/JOINT COMPOUND | BEDROOM (M-17)                   | ND               |
|                          | 1-WB3-30   | WALLBOARD/JOINT COMPOUND | OUTSIDE STAIRWELL<br>(M-17)      | 2% C             |
|                          | 1-WB3-32   | WALLBOARD/JOINT COMPOUND | BEDROOM (M-20)                   | 2% C             |
|                          | 1-WB3-37   | WALLBOARD/JOINT COMPOUND | HALLWAY (P-12)                   | 2% C             |
|                          | 1-WB3-41   | WALLBOARD/JOINT COMPOUND | OUTSIDE STAIRWELL<br>(P-12)      | 2% C             |
|                          | 1-WB3-42   | WALLBOARD/JOINT COMPOUND | KITCHEN (P-9)                    | 2% C             |
|                          | 1-WB3-43   | WALLBOARD/JOINT COMPOUND | HALLWAY (P-9)                    | 2% C             |
|                          | 1-WB3-46   | WALLBOARD/JOINT COMPOUND | KITCHEN (P-15)                   | 2% C             |
|                          | 1-WB3-47   | WALLBOARD/JOINT COMPOUND | LAUNDRY ROOM (P-15)              | ND               |
|                          | 1-WB3-53   | WALLBOARD/JOINT COMPOUND | KITCHEN (P-5)                    | 2% C             |
|                          | 1-WB3-55   | WALLBOARD/JOINT COMPOUND | LIVING ROOM (H-28)               | 2% C             |
|                          | 1-WB3-60   | WALLBOARD/JOINT COMPOUND | KITCHEN (H-28)                   | 2% C             |
|                          | 1-WB3-66   | WALLBOARD/JOINT COMPOUND | HALLWAY (H-14)                   | 2% C             |
|                          | 1-WB3-68   | WALLBOARD/JOINT COMPOUND | HALLWAY (L-1)                    | ND               |
|                          | 1-WB3-71   | WALLBOARD/JOINT COMPOUND | UPSTAIRS HALLWAY (L-1)           | ND               |
|                          | 1-WB3-75   | WALLBOARD/JOINT COMPOUND | LIVING ROOM (L-4)                | 2% C             |
|                          | 1-WB3-76   | WALLBOARD/JOINT COMPOUND | KITCHEN (L-4)                    | 2% C             |
|                          | 1-WB3-81   | WALLBOARD/JOINT COMPOUND | DINING ROOM (K-16)               | 2% C             |
|                          | 1-WB3-83   | WALLBOARD/JOINT COMPOUND | OUTSIDE STAIRWELL<br>(K-16)      | 2% C             |
|                          | 1-WB3-86   | WALLBOARD/JOINT COMPOUND | HALLWAY (K-3)                    | 2% C             |
|                          | 1-WB3-92   | WALLBOARD/JOINT COMPOUND | HALLWAY (J-1)                    | 2% C             |
|                          | 1-WB3-94   | WALLBOARD/JOINT COMPOUND | BEDROOM (P-6)                    | ND               |
|                          | 1-WB3-95   | WALLBOARD/JOINT COMPOUND | Bedroom (P-6)                    | 2% C             |



**Hazardous Materials Inspection Report**

Willow Branch Apartments | Clarkston, Georgia

November 12, 2024 | Terracon Project Number HN247281A



| Willow Branch Apartments |            |                                    |                               |                  |
|--------------------------|------------|------------------------------------|-------------------------------|------------------|
| HA                       | Sample No. | Description                        | Sample Location               | Asbestos Content |
| 2                        | 2-WB4-4    | TEXTURED CEILING                   | MAIN OFFICE                   | ND               |
|                          | 2-WB4-15   | TEXTURED CEILING                   | ROOM (M-3)                    | 2% C             |
|                          | 2-WB4-18   | TEXTURED CEILING                   | HALLWAY (M-5)                 | 2% C             |
|                          | 2-WB4-24   | TEXTURED CEILING                   | KITCHEN (M-14)                | 2% C             |
|                          | 2-WB4-29   | TEXTURED CEILING                   | KITCHEN (M-17)                | 2% C             |
|                          | 2-WB4-34   | TEXTURED CEILING                   | ROOM (M-20)                   | 2% C             |
|                          | 2-WB4-36   | TEXTURED CEILING                   | HALLWAY (P-12)                | 2% C             |
|                          | 2-WB4-44   | TEXTURED CEILING                   | HALLWAY (P-9)                 | 2% C             |
|                          | 2-WB4-48   | TEXTURED CEILING                   | ROOM (P-15)                   | 2% C             |
|                          | 2-WB4-54   | TEXTURED CEILING                   | LIVING ROOM (P-5)             | 2% C             |
|                          | 2-WB4-57   | TEXTURED CEILING                   | LIVING ROOM (H-28)            | 2% C             |
|                          | 2-WB4-70   | TEXTURED CEILING                   | BATHROOM (L-1)                |                  |
|                          | 2-WB4-77   | TEXTURED CEILING                   | UPSTAIRS HALL (L-4)           | 2% C             |
|                          | 2-WB4-82   | TEXTURED CEILING                   | DINING ROOM (K-16)            | 2% C             |
|                          | 2-WB4-84   | TEXTURED CEILING                   | STAIRWELL OUTSIDE UNIT (K-16) |                  |
|                          | 2-WB4-85   | TEXTURED CEILING                   | HALLWAY (K-3)                 | 2% C             |
|                          | 2-WB4-96   | TEXTURED CEILING                   | KITCHEN (P-6)                 | 2% C             |
| 3                        | 3-CA1-5    | EXTERIOR BEIGE WINDOW CAULK        | MAIN OFFICE                   |                  |
|                          | 3-CA1-45   | EXTERIOR BEIGE WINDOW CAULK        | ROOM (P-9)                    |                  |
|                          | 3-CA1-73   | EXTERIOR BLACK & PINK WINDOW CAULK | ROOM (L-1)                    | 3% C             |
| 4                        | 4-SC1-6    | EXTERIOR BEIGE WINDOW GLAZE        | MAIN OFFICE                   | ND               |
|                          | 4-SC1-90   | EXTERIOR WINDOW GLAZE              | MAIN OFFICE                   | ND               |
|                          | 4-SC1-91   | EXTERIOR WINDOW GLAZE              | MAIN OFFICE                   | ND               |
| 5                        | 5-RF3-7    | ROOFING SHINGLES WITH FELT         | MAIN OFFICE                   | ND               |
|                          | 5-RF3-21   | ROOFING SHINGLES WITH FELT         | BUILDING (M-5)                | ND               |
|                          | 5-RF3-50   | ROOFING SHINGLES WITH FELT         | BUILDING (P-15)               | ND               |
|                          | 5-RF3-74   | ROOFING SHINGLES WITH FELT         | BUILDING (L-1)                | ND               |
| 6                        | 6-FC1-8    | DARK BROWN LAYERED ROLL FLOORING   | KITCHEN CLOSET (M-4)          | ND               |
|                          | 6-FC1-20   | DARK BROWN LAYERED ROLL FLOORING   | BUILDING (M-5)                | ND               |
|                          | 6-FC1-23   | DARK BROWN LAYERED ROLL FLOORING   | KITCHEN CLOSET (M-14)         | ND               |
|                          | 6-FC1-28   | DARK BROWN LAYERED ROLL FLOORING   | KITCHEN (M-17)                | ND               |
|                          | 6-FC1-56   | DARK BROWN WOOD ROLL FLOORING      | KITCHEN CLOSET (H-28)         | ND               |
|                          | 6-FC1-69   | DARK BROWN ROLL FLOORING           | HALL CLOSET (L-1)             | ND               |
| 7                        | 7-WB4-9    | TEXTURED WALL                      | BATHROOM (M-4)                | ND               |
|                          | 7-WB4-17   | TEXTURED WALL                      | BATHROOM (M-5)                | ND               |

**Hazardous Materials Inspection Report**

Willow Branch Apartments | Clarkston, Georgia

November 12, 2024 | Terracon Project Number HN247281A



| Willow Branch Apartments |            |                                       |                         |                  |
|--------------------------|------------|---------------------------------------|-------------------------|------------------|
| HA                       | Sample No. | Description                           | Sample Location         | Asbestos Content |
|                          | 7-WB4-25   | TEXTURED WALL                         | KITCHEN (M-14)          | ND               |
|                          | 7-WB4-35   | TEXTURED WALL                         | BATHROOM (P-12)         | 2% C             |
|                          | 7-WB4-58   | TEXTURED WALL                         | BATHROOM (H-28)         | ND               |
|                          | 7-WB4-62   | TEXTURED WALL                         | ROOM (H-14)             | ND               |
|                          | 7-WB4-93   | TEXTURED WALL                         | BATHROOM (J-1)          | 2% C             |
|                          | 7-WB4-97   | TEXTURED WALL                         | KITCHEN (G-6)           | ND               |
| 8                        | 8-FC1-12   | LIGHT BROWN ROLL FLOORING             | ROOM (M-3)              | ND               |
|                          | 8-FC1-31   | LIGHT BROWN LAYERED ROLL FLOORING     | KITCHEN (M-20)          | ND               |
|                          | 8-FC1-38   | LIGHT BROWN ROLL FLOORING             | KITCHEN (P-12)          | ND               |
|                          | 8-FC1-49   | LIGHT BROWN ROLL FLOORING             | KITCHEN (P-15)          | ND               |
|                          | 8-FC1-67   | LIGHT BROWN ROLL FLOORING             | BATHROOM CLOSET (H-14)  | ND               |
| 9                        | 9-SC6-14   | BLACK SINK UNDERCOAT                  | ROOM (M-3)              | 5% C             |
|                          | 9-SC6-27   | BLACK SINK UNDERCOAT                  | KITCHEN (M-17)          | 5% C             |
|                          | 9-SC6-59   | BLACK SINK UNDERCOAT                  | KITCHEN (H-28)          | 5% C             |
| 10                       | 10-CA2-16  | BROWN/BLACK EXTERIOR DOOR CAULK       | ROOM (M-3)              | ND               |
|                          | 10-CA2-39  | BROWN/BLACK EXTERIOR DOOR CAULK       | PATIO (P-12)            | 2% C             |
|                          | 10-CA2-72  | BLACK/PINK EXTERIOR DOOR CAULK        | ROOM (L-1)              | 3% C             |
| 11                       | 11-CA2-33  | WHITE KITCHEN COUNTER CAULK           | ROOM (M-20)             | ND               |
|                          | 11-CA2-40  | WHITE KITCHEN COUNTER CAULK           | ROOM (P-12)             | ND               |
|                          | 11-CA2-51  | WHITE KITCHEN COUNTER CAULK           | ROOM (P-15)             | ND               |
|                          | 11-CA2-52  | WHITE KITCHEN COUNTER CAULK           | ROOM (P-5)              | ND               |
|                          | 11-CA2-61  | WHITE CAULK                           | BATHROOM (H-28)         | ND               |
| 12                       | 12-WB5-63  | POPCORN CEILING                       | LIVING ROOM (H-14)      | 2% C             |
|                          | 12-WB5-64  | POPCORN CEILING                       | HALLWAY (H-14)          | 2% C             |
|                          | 12-WB5-65  | POPCORN CEILING                       | BEDROOM (H-14)          | 2% C             |
|                          | 12-WB5-98  | POPCORN CEILING                       | KITCHEN (G-6)           | 2% C             |
|                          | 12-WB5-99  | POPCORN CEILING                       | HALLWAY (G-6)           | 2% C             |
|                          | 12-WB5-100 | POPCORN CEILING                       | 2ND FLOOR HALLWAY (G-6) | 2% C             |
| 13                       | 13-MG5-1   | BLACK MASTIC UNDER CARPET ON CONCRETE | MAIN OFFICE             | 5% C             |
|                          | 13-MG5-88  | BLACK MASTIC UNDER CARPET ON CONCRETE | MAIN OFFICE             | 5% C             |
|                          | 13-MG5-89  | BLACK MASTIC UNDER CARPET ON CONCRETE | MAIN OFFICE             | 5% C             |

HA = Homogeneous Area

C = Chrysotile Asbestos

ND = None Detected

**Hazardous Materials Inspection Report**

Willow Branch Apartments | Clarkston, Georgia

November 12, 2024 | Terracon Project Number HN247281A



**APPENDIX C**

**ASBESTOS, PB IN WATER, AND PB IN SOIL  
ANALYTICAL LABORATORY REPORTS**

**CHAIN OF CUSTODY  
BULK ASBESTOS ANALYSIS**

|                   |                                                    |                      |                                 |
|-------------------|----------------------------------------------------|----------------------|---------------------------------|
| Client Name:      | <u>Terracon Consultants, Inc</u>                   | Project Name:        | <u>Willow Branch Apartments</u> |
| Address:          | <u>514 Hillcrest Industrial Blvd</u>               | Project Number:      | <u>HN247281A</u>                |
| City, State, Zip: | <u>Macon, Georgia 31204</u>                        | Sampling Date:       | <u>10-07-24</u>                 |
| Contact:          | <u>T. Gordon, T. Peterman, P. Daniel, D. Baird</u> | Phone #:             | <u></u>                         |
| Sampler's Name:   | <u>Patrick Daniel</u>                              | Invoice To Name(s):  | <u></u>                         |
| Report To:        | <u>Contacts</u>                                    | Invoice To Email(s): | <u></u>                         |
| Report to Email:  | <u>Contacts</u>                                    | PO #:                | <u></u>                         |

|    | Sample ID | Sample Location/Description                           | Analysis Requested | Turnaround Time (TAT) | Comments |
|----|-----------|-------------------------------------------------------|--------------------|-----------------------|----------|
| 1  | 13-MG5- 1 | BLACK MASTIC UNDER CARPET ON CONCRETE- MAIN OFFICE    | PLM                | STD                   |          |
| 2  | 1-WB3-2   | WB/JC - MAIN OFFICE                                   | PLM                | STD                   |          |
| 3  | 1-WB3-3   | WB/JC - MAIN OFFICE                                   | PLM                | STD                   |          |
| 4  | 2-WB4-4   | TEXTURED CEILING - MAIN OFFICE                        | PLM                | STD                   |          |
| 5  | 3-CA1-5   | EXTERIOR BEIGE WINDOW CAULK - MAIN OFFICE             | PLM                | STD                   |          |
| 6  | 4-SC1-6   | EXTERIOR WINDOW GLAZE- MAIN OFFICE                    | PLM                | STD                   |          |
| 7  | 5-RF3-7   | ROOFING SHINGLES WITH FELT - MAIN OFFICE              | PLM                | STD                   |          |
| 8  | 6-FC1-8   | DARK BROWN LAYERED ROLL FLOORING-KITCHEN CLOSET (M-4) | PLM                | STD                   |          |
| 9  | 7-WB4-9   | TEXTURED WALL-BATHROOM (M-4)                          | PLM                | STD                   |          |
| 10 | 1-WB3-10  | WB/JC- LIVING ROOM (M-4)                              | PLM                | STD                   |          |
| 11 | 1-WB3-11  | BROWN WB/JC - EXTERIOR WALL STAIRWELL (M-4)           | PLM                | STD                   |          |
| 12 | 8-FC1-12  | LIGHT BROWN ROLL FLOORING (M-3)                       | PLM                | STD                   |          |
| 13 | 1-WB3-13  | WB/JC - HALLWAY (M-3)                                 | PLM                | STD                   |          |
| 14 | 9-SC6-14  | BLACK SINK UNDERCOAT (M-3)                            | PLM                | STD                   |          |
| 15 | 2-WB4-15  | TEXTURED CEILING (M-3)                                | PLM                | STD                   |          |
| 16 | 10-CA2-16 | BROWN/BLACK DOOR CAULK (M-3)                          | PLM                | STD                   |          |
| 17 | 7-WB4-17  | TEXTURED WALL - BATHROOM (M-5)                        | PLM                | STD                   |          |
| 18 | 2-WB4-18  | TEXTURED CEILING - HALLWAY (M-5)                      | PLM                | STD                   |          |
| 19 | 1-WB3-19  | WB/JC -HALLWAY (M-5)                                  | PLM                | STD                   |          |
| 20 | 6-FC1-20  | DARK BROWN LAYERED ROLL FLOORING (M-5)                | PLM                | STD                   |          |

Relinquished by:

Patrick Daniel

Received by:

[Signature]

Relinquished by:

[Signature]

Received by:

Date/Time:

10-09-24 0930

Date/Time:

10-9 1012

Date/Time:

10-9 1210

Date/Time:

Submission of samples to the laboratory constitutes acceptance of AES's Terms & Conditions. Client assumes sole responsibility for damage or loss of samples before we accept them. Samples received after 3PM or on Saturday are considered as received the following business day. If no TAT is marked on COC, AES will proceed with standard TAT.

Asbestos COC7.15.19

|                                  |                                                    |                               |
|----------------------------------|----------------------------------------------------|-------------------------------|
| Lab Recipient: <u>Anna Neall</u> | FOR LAB USE ONLY<br>Date/Time: <u>10-9-24 1210</u> | Method of Shipment: <u>CO</u> |
|----------------------------------|----------------------------------------------------|-------------------------------|

**CHAIN OF CUSTODY  
BULK ASBESTOS ANALYSIS**

|                   |                                                    |                      |                                 |
|-------------------|----------------------------------------------------|----------------------|---------------------------------|
| Client Name:      | <u>Terracon Consultants, Inc</u>                   | Project Name:        | <u>Willow Branch Apartments</u> |
| Address:          | <u>514 Hillcrest Industrial Blvd</u>               | Project Number:      | <u>HN247281A</u>                |
| City, State, Zip: | <u>Macon, Georgia 31204</u>                        | Sampling Date:       | <u>10-07-24</u>                 |
| Contact:          | <u>T. Gordon, T. Peterman, P. Daniel, D. Baird</u> | Phone #:             | <u></u>                         |
| Sampler's Name:   | <u>Patrick Daniel</u>                              | Invoice To Name(s):  | <u></u>                         |
| Report To:        | <u>Contacts</u>                                    | Invoice To Email(s): | <u></u>                         |
| Report to Email:  | <u>Contacts</u>                                    | PO #:                | <u></u>                         |

|    | Sample ID | Sample Location/Description                      | Analysis Requested | Turnaround Time (TAT) | Comments |
|----|-----------|--------------------------------------------------|--------------------|-----------------------|----------|
| 1  | 5-RF3-21  | ROOFING SHINGLES (M-5)                           | PLM                | STD                   |          |
| 2  | 1-WB3-22  | WB/JC - HALLWAY (M-14)                           | PLM                | STD                   |          |
| 3  | 6-FC1-23  | DARK BROWN ROLL FLOORING-KITCHEN CLOSET (M-14)   | PLM                | STD                   |          |
| 4  | 2-WB4-24  | TEXTURED CEILING - KITCHEN (M-14)                | PLM                | STD                   |          |
| 5  | 7-WB4-25  | TEXTURED WALL - KITCHEN (M-14)                   | PLM                | STD                   |          |
| 6  | 1-WB3-26  | WB/JC - BEDROOM (M-17)                           | PLM                | STD                   |          |
| 7  | 9-SC6-27  | BLACK SINK UNDERCOAT-KITCHEN (M-17)              | PLM                | STD                   |          |
| 8  | 6-FC1-28  | DARK BROWN ROLL FLOORING - KITCHEN (M-17)        | PLM                | STD                   |          |
| 9  | 2-WB4-29  | TEXTURED CEILING - KITCHEN (M-17)                | PLM                | STD                   |          |
| 10 | 1-WB3-30  | BROWN WB/JC - STAIRWELL OUTSIDE (M-17)           | PLM                | STD                   |          |
| 11 | 8-FC1-31  | LIGHT BROWN LAYERED ROLL FLOORING-KITCHEN (M-20) | PLM                | STD                   |          |
| 12 | 1-WB3-32  | WB/JC- BEDROOM (M-20)                            | PLM                | STD                   |          |
| 13 | 11-CA2-33 | KITCHEN COUNTER CAULK (M-20)                     | PLM                | STD                   |          |
| 14 | 2-WB4-34  | TEXTURED CEILING- (M-20)                         | PLM                | STD                   |          |
| 15 | 7-WB4-35  | TEXTURED BATHROOM WALL - (P-12)                  | PLM                | STD                   |          |
| 16 | 2-WB4-36  | TEXTURED CEILING- HALLWAY (P-12)                 | PLM                | STD                   |          |
| 17 | 1-WB3-37  | WB/JC-HALLWAY (P-12)                             | PLM                | STD                   |          |
| 18 | 8-FC1-38  | LIGHT BROWN ROLL FLOORING - KITCHEN (P-12)       | PLM                | STD                   |          |
| 19 | 10-CA2-39 | BROWN/BLACK EXTERIOR DOOR CAULK-PATIO (P-12)     | PLM                | STD                   |          |
| 20 | 11-CA2-40 | WHITE KITCHEN COUNTER CAULK - (P-12)             | PLM                | STD                   |          |

Relinquished by:

Patrick Daniel

[Signature]

[Signature]

Received by:

Relinquished by:

Received by:

Date/Time:

10-09-24 0930

Date/Time:

Date/Time:

Date/Time:

Submission of samples to the laboratory constitutes acceptance of AES's Terms & Conditions. Client assumes sole responsibility for damage or loss of samples before we accept them. Samples received after 3PM or on Saturday are considered as received the following business day. If no TAT is marked on COC, AES will proceed with standard TAT.

Asbestos COC7.15.19

FOR LAB USE ONLY

Lab Recipient: Anna Neal

Date/Time: 10-9-24 1210

Method of Shipment: CO

**CHAIN OF CUSTODY  
BULK ASBESTOS ANALYSIS**

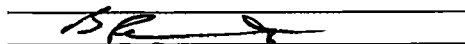
|                                                             |                                               |
|-------------------------------------------------------------|-----------------------------------------------|
| Client Name: <u>Terracon Consultants, Inc</u>               | Project Name: <u>Willow Branch Apartments</u> |
| Address: <u>514 Hillcrest Industrial Blvd</u>               | Project Number: <u>HN247281A</u>              |
| City, State, Zip: <u>Macon, Georgia 31204</u>               | Sampling Date: <u>10-07-24</u>                |
| Contact: <u>T. Gordon, T. Peterman, P. Daniel, D. Baird</u> | Phone #: _____                                |
| Sampler's Name: <u>Patrick Daniel</u>                       | Invoice To Name(s): _____                     |
| Report To: <u>Contacts</u>                                  | Invoice To Email(s): _____                    |
| Report to Email: <u>Contacts</u>                            | PO #: _____                                   |

|    | Sample ID | Sample Location/Description                | Analysis Requested | Turnaround Time (TAT) | Comments |
|----|-----------|--------------------------------------------|--------------------|-----------------------|----------|
| 1  | 1-WB3-41  | BROWN WB/JC - STAIRWELL OUTSIDE (P-12)     | PLM                | STD                   |          |
| 2  | 1-WB3-42  | WB/JC - KITCHEN (P-9)                      | PLM                | STD                   |          |
| 3  | 1-WB3-43  | WB/JC - HALLWAY (P-9)                      | PLM                | STD                   |          |
| 4  | 2-WB4-44  | TEXTURED CEILING - HALLWAY (P-9)           | PLM                | STD                   |          |
| 5  | 3-CA1-45  | BEIGE EXTERIOR WINDOW CAULK (P-9)          | PLM                | STD                   |          |
| 6  | 1-WB3-46  | WB/JC - KITCHEN (P-15)                     | PLM                | STD                   |          |
| 7  | 1-WB3-47  | WB/JC - LAUNDRY ROOM (P-15)                | PLM                | STD                   |          |
| 8  | 2-WB4-48  | TEXTURED CEILING (P-15)                    | PLM                | STD                   |          |
| 9  | 8-FC1-49  | LIGHT BROWN ROLL FLOORING - KITCHEN (P-15) | PLM                | STD                   |          |
| 10 | 5-RF3-50  | ROOFING SHINGLE WITH FELT - (P-15)         | PLM                | STD                   |          |
| 11 | 11-CA2-51 | WHITE KITCHEN COUNTER CAULK- (P-15)        | PLM                | STD                   |          |
| 12 | 11-CA2-52 | WHITE KITCHEN COUNTER CAULK- (P-5)         | PLM                | STD                   |          |
| 13 | 1-WB3-53  | WB/JC - KITCHEN (P-5)                      | PLM                | STD                   |          |
| 14 | 2-WB4-54  | TEXTURED CEILING - LIVING ROOM (P-5)       | PLM                | STD                   |          |
| 15 |           |                                            |                    |                       |          |
| 16 |           |                                            |                    |                       |          |
| 17 |           |                                            |                    |                       |          |
| 18 |           |                                            |                    |                       |          |
| 19 |           |                                            |                    |                       |          |
| 20 |           |                                            |                    |                       |          |

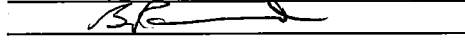
Relinquished by:

*Patrick Daniel*

Received by:



Relinquished by:



Received by:



Date/Time:

10-09-24 0930

Date/Time:

10-9 1012

Date/Time:

10-9 1210

Date/Time:

\_\_\_\_\_

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Asbestos COC7.15.19

FOR LAB USE ONLY

Lab Recipient:

Anna Neal

Date/Time:

10-9-24
1210

Method of Shipment:

CO



**CHAIN OF CUSTODY  
BULK ASBESTOS ANALYSIS**

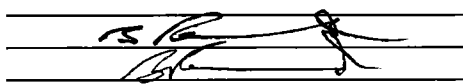
|                   |                                                  |                      |                                 |
|-------------------|--------------------------------------------------|----------------------|---------------------------------|
| Client Name:      | <u>Terracon Consultants, Inc</u>                 | Project Name:        | <u>Willow Branch Apartments</u> |
| Address:          | <u>514 Hillcrest Industrial Blvd</u>             | Project Number:      | <u>HN247281A</u>                |
| City, State, Zip: | <u>Macon, Georgia 31204</u>                      | Sampling Date:       | <u>10-08-24</u>                 |
| Contact:          | <u>T Peterman/A Whipple/ T Gordon/ D Ylander</u> | Phone #:             | <u></u>                         |
| Sampler's Name:   | <u>Patrick Daniel #19606</u>                     | Invoice To Name(s):  | <u></u>                         |
| Report To:        | <u>Contacts</u>                                  | Invoice To Email(s): | <u></u>                         |
| Report to Email:  | <u></u>                                          | PO #:                | <u></u>                         |

|    | Sample ID | Sample Location/Description                          | Analysis Requested | Turnaround Time (TAT) | Comments |
|----|-----------|------------------------------------------------------|--------------------|-----------------------|----------|
| 1  | 1-WB3-55  | WALL BOARD & JOINT COMPOUND, LIVING ROOM (H-28)      | PLM                | STD                   |          |
| 2  | 6-FC1-56  | DARK BROWN WOOD ROLL FLOORING, KITCHEN CLOSET (H-28) | PLM                | STD                   |          |
| 3  | 2-WB4-57  | TEXTURED CEILING, LIVING ROOM (H-28)                 | PLM                | STD                   |          |
| 4  | 7-WB4-58  | TEXTURED WALL, BATHROOM (H-28)                       | PLM                | STD                   |          |
| 5  | 9-SC6-59  | BLACK SINK UNDERCOAT, KITCHEN (H-28)                 | PLM                | STD                   |          |
| 6  | 1-WB3-60  | WALL BOARD & JOINT COMPOUND, KITCHEN (H-28)          | PLM                | STD                   |          |
| 7  | 11-CA2-61 | WHITE CAULK, BATHROOM (H-28)                         | PLM                | STD                   |          |
| 8  | 7-WB4-62  | TEXTURED WALL (H-14)                                 | PLM                | STD                   |          |
| 9  | 12-WB5-63 | POPCORN CEILING, LIVING ROOM (H-14)                  | PLM                | STD                   |          |
| 10 | 12-WB5-64 | POPCORN CEILING, HALLWAY (H-14)                      | PLM                | STD                   |          |
| 11 | 12-WB5-65 | POPCORN CEILING, BEDROOM (H-14)                      | PLM                | STD                   |          |
| 12 | 1-WB3-66  | WALLBOARD & JOINT COMPOUND, HALLWAY (H-14)           | PLM                | STD                   |          |
| 13 | 8-FC1-67  | LIGHT BROWN ROLL FLOORING, BATHROOM CLOSET (H-14)    | PLM                | STD                   |          |
| 14 | 1-WB3-68  | WALLBOARD & JOINT COMPOUND, HALL CLOSET (L-1)        | PLM                | STD                   |          |
| 15 | 6-FC1-69  | DARK BROWN ROLL FLOORING, HALL CLOSET (L-1)          | PLM                | STD                   |          |
| 16 | 2-WB4-70  | TEXTURED CEILING, BATHROOM (L-1)                     | PLM                | STD                   |          |
| 17 | 1-WB3-71  | WALLBOARD & JOINT COMPOUND, UPSTAIRS HALL (L-1)      | PLM                | STD                   |          |
| 18 | 10-CA2-72 | EXTERIOR BLACK & PINK DOOR CAULK (L-1)               | PLM                | STD                   |          |
| 19 | 3-CA1-73  | EXTERIOR BLACK & PINK WINDOW CAULK (L-1)             | PLM                | STD                   |          |
| 20 | 5-RF3-74  | ROOF SHINGLE WITH FELT (L-1)                         | PLM                | STD                   |          |

Relinquished by:

*Patrick Daniel*

Received by:



Relinquished by:

Received by:

Date/Time:

10-09-24 0930

Date/Time:

10-9-1012

Date/Time:

10-9-1210

Date/Time:

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Asbestos COC7.15.19

|                                 |                                                    |                               |
|---------------------------------|----------------------------------------------------|-------------------------------|
| Lab Recipient: <u>Anna Neal</u> | FOR LAB USE ONLY<br>Date/Time: <u>10-9-24 1210</u> | Method of Shipment: <u>CD</u> |
|---------------------------------|----------------------------------------------------|-------------------------------|

**CHAIN OF CUSTODY  
BULK ASBESTOS ANALYSIS**

|                   |                                                  |                      |                                 |
|-------------------|--------------------------------------------------|----------------------|---------------------------------|
| Client Name:      | <u>Terracon Consultants, Inc</u>                 | Project Name:        | <u>Willow Branch Apartments</u> |
| Address:          | <u>514 Hillcrest Industrial Blvd</u>             | Project Number:      | <u>HN247281A</u>                |
| City, State, Zip: | <u>Macon, Georgia 31204</u>                      | Sampling Date:       | <u>10-08-24</u>                 |
| Contact:          | <u>T Peterman/A Whipple/ T Gordon/ D Ylander</u> | Phone #:             | <u></u>                         |
| Sampler's Name:   | <u>Patrick Danne</u>                             | Invoice To Name(s):  | <u></u>                         |
| Report To:        | <u>Contacts</u>                                  | Invoice To Email(s): | <u></u>                         |
| Report to Email:  | <u></u>                                          | PO #:                | <u></u>                         |

|    | Sample ID | Sample Location/Description                                      | Analysis Requested | Turnaround Time (TAT) | Comments |
|----|-----------|------------------------------------------------------------------|--------------------|-----------------------|----------|
| 1  | 1-WB3-75  | WALLBAORD & JOINT COMPOUND, LIVING ROOM (L-4)                    | PLM                | STD                   |          |
| 2  | 1-WB3-76  | WALLBAORD & JOINT COMPOUND, KITCHEN (L-4)                        | PLM                | STD                   |          |
| 3  | 2-WB4-77  | TEXTURED CEILING, UPSTAIRS HALL (L-4)                            | PLM                | STD                   |          |
| 4  | 13-FC1-78 | WHITE SQUARE PATTERN LAYRED ROLL FLOORING, KITCHEN CLOSET (K-16) | PLM                | STD                   |          |
| 5  | 13-FC1-79 | WHITE SQUARE PATTERN LAYRED ROLL FLOORING, KITCHEN CLOSET (K-16) | PLM                | STD                   |          |
| 6  | 13-FC1-80 | WHITE SQUARE PATTERN LAYRED ROLL FLOORING, LAUNDRY ROOM (K-16)   | PLM                | STD                   |          |
| 7  | 1-WB3-81  | WALLBAORD & JOINT COMPOUND, DINING ROOM (K-16)                   | PLM                | STD                   |          |
| 8  | 2-WB4-82  | TEXTURED CEILING, DINING ROOM (K-16)                             | PLM                | STD                   |          |
| 9  | 1-WB3-83  | WALLBAORD & JOINT COMPOUND, STAIRWELL OUTSIDE UNIT (K-16)        | PLM                | STD                   |          |
| 10 | 2-WB4-84  | TEXTURED CEILING, STAIRWELL OUTSIDE UNIT (K-16)                  | PLM                | STD                   |          |
| 11 | 2-WB4-85  | TEXTURED CEILING, HALLWAY (K-3)                                  | PLM                | STD                   |          |
| 12 | 1-WB3-86  | WALLBOARD & JOINT COMPOUND HALLWAY (K-3)                         | PLM                | STD                   |          |
| 13 | 11-CA2-87 | WHITE KITCHEN CAULK (K-3)                                        | PLM                | STD                   |          |
| 14 | 13-MG5-88 | BLACK MASTIC UNDER CARPET CONCRETE, MAIN OFFICE                  | PLM                | STD                   |          |
| 15 | 13-MG5-89 | BLACK MASTIC UNDER CARPET CONCRETE, MAIN OFFICE                  | PLM                | STD                   |          |
| 16 | 4-SC1-90  | EXTERIOR WINDOW GLAZE, MAIN OFFICE                               | PLM                | STD                   |          |
| 17 | 4-SC1-91  | EXTERIOR WINDOW GLAZE, MAIN OFFICE                               | PLM                | STD                   |          |
| 18 | 1-WB3-92  | WALLBOARD & JOINT COMPOUND, HALLWAY (J-1)                        | PLM                | STD                   |          |
| 19 | 7-WB4-93  | TEXTURED WALL, BATHROOM (J-1)                                    | PLM                | STD                   |          |
| 20 | 1-WB3-94  | WALLBOARD & JOINT COMPOUND, BEDROOM 1 (P-6)                      | PLM                | STD                   |          |

Relinquished by:

*Patrick Daniel*

Date/Time:

10-09-24 0930

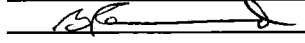
Received by:



Date/Time:

10-9-10-12

Relinquished by:



Date/Time:

10-9-12-10

Received by:

Date/Time:

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Asbestos COC7.15.19

FOR LAB USE ONLY

Lab Recipient:

Anna Neal

Date/Time:

10-9-24 1210

Method of Shipment:

CO

**CHAIN OF CUSTODY  
BULK ASBESTOS ANALYSIS**

|                   |                                                  |                      |                                 |
|-------------------|--------------------------------------------------|----------------------|---------------------------------|
| Client Name:      | <u>Terracon Consultants, Inc</u>                 | Project Name:        | <u>Willow Branch Apartments</u> |
| Address:          | <u>514 Hillcrest Industrial Blvd</u>             | Project Number:      | <u>HN247281A</u>                |
| City, State, Zip: | <u>Macon, Georgia 31204</u>                      | Sampling Date:       | <u>10-08-24</u>                 |
| Contact:          | <u>T Peterman/A Whipple/ T Gordon/ D Ylander</u> | Phone #:             | <u></u>                         |
| Sampler's Name:   | <u>Patrick Daniel</u>                            | Invoice To Name(s):  | <u></u>                         |
| Report To:        | <u>Contacts</u>                                  | Invoice To Email(s): | <u></u>                         |
| Report to Email:  | <u>Contacts</u>                                  | PO #:                | <u></u>                         |

|    | Sample ID  | Sample Location/Description                 | Analysis Requested | Turnaround Time (TAT) | Comments |
|----|------------|---------------------------------------------|--------------------|-----------------------|----------|
| 1  | 1-WB3-95   | WALLBOARD & JOINT COMPOUND, BEDROOM 2 (P-6) | PLM                | STD                   |          |
| 2  | 2-WB4-96   | TEXTURED CEILING, KITCHEN (P-6)             | PLM                | STD                   |          |
| 3  | 7-WB4-97   | TEXTURED WALL, KITCHEN (P-6)                | PLM                | STD                   |          |
| 4  | 12-WB5-98  | POPCORN CEILING, KITCHEN (G-6)              | PLM                | STD                   |          |
| 5  | 12-WB5-99  | POPCORN CEILING, HALLWAY (G-6)              | PLM                | STD                   |          |
| 6  | 12-WB5-100 | POPCORN CEILING, HALLWAY 2ND FLOOR (G-6)    | PLM                | STD                   |          |
| 7  |            |                                             |                    |                       |          |
| 8  |            |                                             |                    |                       |          |
| 9  |            |                                             |                    |                       |          |
| 10 |            |                                             |                    |                       |          |
| 11 |            |                                             |                    |                       |          |
| 12 |            |                                             |                    |                       |          |
| 13 |            |                                             |                    |                       |          |
| 14 |            |                                             |                    |                       |          |
| 15 |            |                                             |                    |                       |          |
| 16 |            |                                             |                    |                       |          |
| 17 |            |                                             |                    |                       |          |
| 18 |            |                                             |                    |                       |          |
| 19 |            |                                             |                    |                       |          |
| 20 |            |                                             |                    |                       |          |

Relinquished by:

*Patrick Daniel*

Received by:

*[Signature]*

Relinquished by:

*[Signature]*

Received by:

Date/Time:

10-09-24 0930

Date/Time:

10-9 1012

Date/Time:

10-9 1210

Date/Time:

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Asbestos COC7.15.19

|                                 |                                                    |                               |
|---------------------------------|----------------------------------------------------|-------------------------------|
| Lab Recipient: <u>Anna Neel</u> | FOR LAB USE ONLY<br>Date/Time: <u>10-9-24 1210</u> | Method of Shipment: <u>CO</u> |
|---------------------------------|----------------------------------------------------|-------------------------------|

**Client:** Terracon  
**Project Name:** Willow Branch Apartments  
**Lab ID:** 2410730

## Case Narrative

Sample Receiving Nonconformance:

Sample "7-WB3-93" was not listed on the Chain of Custody but was present and received. The laboratory proceeded with analysis of all samples that were received.

Samples 2410730-028A; 2410730-031A had two types of flooring each. Samples 2410730-078A; 2410730-079A; 2410730-080A had four types of flooring each. Client will be charged for 11 extra samples.

## Bulk Sample Summary Report

Report Date: 25-Oct-24

Client Name: **Terracon**Job Number: **2410730**Project Name: **Willow Branch Apartments**Project Number: **HN247281A**

| Client ID                | AES ID       | Location                                             | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|--------------------------|--------------|------------------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                          |              |                                                      | CH                          | AM | CR | AN | TR | AC |                                          |
| 13-MG5-1<br><br>Layer: 1 | 2410730-001A | Black Mastic Under Carpet<br>On Concrete-Main Office | 5                           | ND | ND | ND | ND | ND | Black mastic                             |
| 1-WB3-2<br><br>Layer: 1  | 2410730-002A | WB/JC-Main Office                                    | ND                          | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 1-WB3-2<br><br>Layer: 2  | 2410730-002A | WB/JC-Main Office                                    | ND                          | ND | ND | ND | ND | ND |                                          |
| 1-WB3-3<br><br>Layer: 1  | 2410730-003A | WB/JC-Main Office                                    | ND                          | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 1-WB3-3<br><br>Layer: 2  | 2410730-003A | WB/JC-Main Office                                    | ND                          | ND | ND | ND | ND | ND |                                          |
| 2-WB4-4<br><br>Layer: 1  | 2410730-004A | Textured Ceiling-Main Office                         | ND                          | ND | ND | ND | ND | ND | Texture. Paint included as binder        |

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophyllite

For comments on the samples, see the individual analysis sheets.

ND = None Detected

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These test results apply only to those samples actually tested, as submitted by the client. All percentages are reported by visually estimated volume.

PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials, quantitative TEM is currently the only method that can be used to determine conclusive asbestos content. Interpretation and use of test results are the client's responsibility.

Laboratory liability is limited to the cost of analysis. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NVLAP or any agency of the Federal Government.

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID           | AES ID       | Location                                | Asbestos Mineral Percentage |    |    |    |    |    | Comments                 |
|---------------------|--------------|-----------------------------------------|-----------------------------|----|----|----|----|----|--------------------------|
|                     |              |                                         | CH                          | AM | CR | AN | TR | AC |                          |
| 3-CA1-5<br>Layer: 1 | 2410730-005A | Exterior Beige Window Caulk-Main Office | ND                          | ND | ND | ND | ND | ND | Paint included as binder |
| 3-CA1-5<br>Layer: 2 | 2410730-005A | Exterior Beige Window Caulk-Main Office | ND                          | ND | ND | ND | ND | ND |                          |
| 4-SC1-6<br>Layer: 1 | 2410730-006A | Exterior Window Glaze-Main Office       | ND                          | ND | ND | ND | ND | ND | Paint included as binder |
| 5-RF3-7<br>Layer: 1 | 2410730-007A | Roofing Shingles With Felt-Main Office  | ND                          | ND | ND | ND | ND | ND |                          |
| 5-RF3-7<br>Layer: 2 | 2410730-007A | Roofing Shingles With Felt-Main Office  | ND                          | ND | ND | ND | ND | ND |                          |
| 5-RF3-7<br>Layer: 3 | 2410730-007A | Roofing Shingles With Felt-Main Office  | ND                          | ND | ND | ND | ND | ND |                          |

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina



## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID            | AES ID       | Location                                            | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|----------------------|--------------|-----------------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                      |              |                                                     | CH                          | AM | CR | AN | TR | AC |                                          |
| 6-FC1-8<br>Layer: 1  | 2410730-008A | Dark Brown Layered Roll Flooring-Kitchen Closet (M) | ND                          | ND | ND | ND | ND | ND | Vinyl                                    |
| 6-FC1-8<br>Layer: 2  | 2410730-008A | Dark Brown Layered Roll Flooring-Kitchen Closet (M) | ND                          | ND | ND | ND | ND | ND | Backing                                  |
| 6-FC1-8<br>Layer: 3  | 2410730-008A | Dark Brown Layered Roll Flooring-Kitchen Closet (M) | ND                          | ND | ND | ND | ND | ND | Leveling compound                        |
| 7-WB4-9<br>Layer: 1  | 2410730-009A | Textured Wall-Bathroom (M-4)                        | ND                          | ND | ND | ND | ND | ND | Texture. Paint included as binder        |
| 7-WB4-9<br>Layer: 2  | 2410730-009A | Textured Wall-Bathroom (M-4)                        | ND                          | ND | ND | ND | ND | ND |                                          |
| 1-WB3-10<br>Layer: 1 | 2410730-010A | WB/JC-Living Room (M-4)                             | ND                          | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |

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For comments on the samples, see the individual analysis sheets.

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID                | AES ID       | Location                                  | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|--------------------------|--------------|-------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                          |              |                                           | CH                          | AM | CR | AN | TR | AC |                                          |
| 1-WB3-10<br><br>Layer: 2 | 2410730-010A | WB/JC-Living Room (M-4)                   | ND                          | ND | ND | ND | ND | ND |                                          |
| 1-WB3-10<br><br>Layer: 3 | 2410730-010A | WB/JC-Living Room (M-4)                   | ND                          | ND | ND | ND | ND | ND |                                          |
| 1-WB3-11<br><br>Layer: 1 | 2410730-011A | Brown WB/JC-Exterior Wall Stairwell (M-4) | ND                          | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 1-WB3-11<br><br>Layer: 2 | 2410730-011A | Brown WB/JC-Exterior Wall Stairwell (M-4) | ND                          | ND | ND | ND | ND | ND |                                          |
| 8-FC1-12<br><br>Layer: 1 | 2410730-012A | Light Brown Roll Flooring (M-3)           | ND                          | ND | ND | ND | ND | ND | Vinyl                                    |
| 8-FC1-12<br><br>Layer: 2 | 2410730-012A | Light Brown Roll Flooring (M-3)           | ND                          | ND | ND | ND | ND | ND | Backing                                  |

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophyllite

For comments on the samples, see the individual analysis sheets.

ND = None Detected

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID                 | AES ID       | Location                        | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|---------------------------|--------------|---------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                           |              |                                 | CH                          | AM | CR | AN | TR | AC |                                          |
| 8-FC1-12<br><br>Layer: 3  | 2410730-012A | Light Brown Roll Flooring (M-3) | ND                          | ND | ND | ND | ND | ND | Leveling compound                        |
| 1-WB3-13<br><br>Layer: 1  | 2410730-013A | WB/JC-Hallway (M-3)             | ND                          | ND | ND | ND | ND | ND | Paint                                    |
| 9-SC6-14<br><br>Layer: 1  | 2410730-014A | Black Sink Undercoat (M-3)      | 5                           | ND | ND | ND | ND | ND | Black mastic                             |
| 2-WB4-15<br><br>Layer: 1  | 2410730-015A | Textured Ceiling (M-3)          | 2                           | ND | ND | ND | ND | ND | Texture. Paint included as binder        |
| 10-CA2-16<br><br>Layer: 1 | 2410730-016A | Brown/Black Door Caulk (M-3)    | ND                          | ND | ND | ND | ND | ND | Paint included as binder                 |
| 7-WB4-17<br><br>Layer: 1  | 2410730-017A | Textured Wall-Bathroom (M-5)    | ND                          | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |

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ND = None Detected

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID            | AES ID       | Location                               | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|----------------------|--------------|----------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                      |              |                                        | CH                          | AM | CR | AN | TR | AC |                                          |
| 7-WB4-17<br>Layer: 2 | 2410730-017A | Textured Wall-Bathroom (M-5)           | ND                          | ND | ND | ND | ND | ND |                                          |
| 7-WB4-17<br>Layer: 3 | 2410730-017A | Textured Wall-Bathroom (M-5)           | ND                          | ND | ND | ND | ND | ND |                                          |
| 2-WB4-18<br>Layer: 1 | 2410730-018A | Textured Ceiling-Hallway (M-5)         | 2                           | ND | ND | ND | ND | ND | Texture. Paint included as binder        |
| 2-WB4-18<br>Layer: 2 | 2410730-018A | Textured Ceiling-Hallway (M-5)         | ND                          | ND | ND | ND | ND | ND |                                          |
| 1-WB3-19<br>Layer: 1 | 2410730-019A | WB/JC-Hallway (M-5)                    | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 6-FC1-20<br>Layer: 1 | 2410730-020A | Dark Brown Layered Roll Flooring (M-5) | ND                          | ND | ND | ND | ND | ND | Vinyl                                    |

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID                | AES ID       | Location                                       | Asbestos Mineral Percentage |    |    |    |    |    | Comments          |
|--------------------------|--------------|------------------------------------------------|-----------------------------|----|----|----|----|----|-------------------|
|                          |              |                                                | CH                          | AM | CR | AN | TR | AC |                   |
| 6-FC1-20<br><br>Layer: 2 | 2410730-020A | Dark Brown Layered Roll Flooring (M-5)         | ND                          | ND | ND | ND | ND | ND | Leveling compound |
| 5-RF3-21<br><br>Layer: 1 | 2410730-021A | Roofing Shingles (M-5)                         | ND                          | ND | ND | ND | ND | ND |                   |
| 5-RF3-21<br><br>Layer: 2 | 2410730-021A | Roofing Shingles (M-5)                         | ND                          | ND | ND | ND | ND | ND |                   |
| 1-WB3-22<br><br>Layer: 1 | 2410730-022A | WB/JC-Hallway (M-14)                           | ND                          | ND | ND | ND | ND | ND | Paint             |
| 6-FC1-23<br><br>Layer: 1 | 2410730-023A | Dark Brown Roll Flooring-Kitchen Closet (M-14) | ND                          | ND | ND | ND | ND | ND | Vinyl             |
| 6-FC1-23<br><br>Layer: 2 | 2410730-023A | Dark Brown Roll Flooring-Kitchen Closet (M-14) | ND                          | ND | ND | ND | ND | ND | Glue              |

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

# Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID                | AES ID       | Location                                       | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|--------------------------|--------------|------------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                          |              |                                                | CH                          | AM | CR | AN | TR | AC |                                          |
| 6-FC1-23<br><br>Layer: 3 | 2410730-023A | Dark Brown Roll Flooring-Kitchen Closet (M-14) | ND                          | ND | ND | ND | ND | ND | Leveling compound                        |
| 2-WB4-24<br><br>Layer: 1 | 2410730-024A | Textured Ceiling-Kitchen (M-14)                | ND                          | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 2-WB4-24<br><br>Layer: 2 | 2410730-024A | Textured Ceiling-Kitchen (M-14)                | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 7-WB4-25<br><br>Layer: 1 | 2410730-025A | Textured Wall-Kitchen (M-14)                   | ND                          | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 7-WB4-25<br><br>Layer: 2 | 2410730-025A | Textured Wall-Kitchen (M-14)                   | ND                          | ND | ND | ND | ND | ND |                                          |
| 1-WB3-26<br><br>Layer: 1 | 2410730-026A | WB/JC-Bedroom (M-17)                           | ND                          | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina



## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID            | AES ID       | Location                                   | Asbestos Mineral Percentage |    |    |    |    |    | Comments     |
|----------------------|--------------|--------------------------------------------|-----------------------------|----|----|----|----|----|--------------|
|                      |              |                                            | CH                          | AM | CR | AN | TR | AC |              |
| 1-WB3-26<br>Layer: 2 | 2410730-026A | WB/JC-Bedroom (M-17)                       | ND                          | ND | ND | ND | ND | ND |              |
| 1-WB3-26<br>Layer: 3 | 2410730-026A | WB/JC-Bedroom (M-17)                       | ND                          | ND | ND | ND | ND | ND |              |
| 9-SC6-27<br>Layer: 1 | 2410730-027A | Black Sink<br>Undercoat-Kitchen (M-17)     | 5                           | ND | ND | ND | ND | ND | Black mastic |
| 6-FC1-28<br>Layer: 1 | 2410730-028A | Dark Brown Roll<br>Flooring-Kitchen (M-17) | ND                          | ND | ND | ND | ND | ND | Beige vinyl  |
| 6-FC1-28<br>Layer: 2 | 2410730-028A | Dark Brown Roll<br>Flooring-Kitchen (M-17) | ND                          | ND | ND | ND | ND | ND | Glue         |
| 6-FC1-28<br>Layer: 1 | 2410730-028B | Dark Brown Roll<br>Flooring-Kitchen (M-17) | ND                          | ND | ND | ND | ND | ND | Tan vinyl    |

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID                | AES ID       | Location                                         | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|--------------------------|--------------|--------------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                          |              |                                                  | CH                          | AM | CR | AN | TR | AC |                                          |
| 6-FC1-28<br><br>Layer: 2 | 2410730-028B | Dark Brown Roll Flooring-Kitchen (M-17)          | ND                          | ND | ND | ND | ND | ND | Backing                                  |
| 2-WB4-29<br><br>Layer: 1 | 2410730-029A | Textured Ceiling-Kitchen (M-17)                  | ND                          | ND | ND | ND | ND | ND | Texture. Paint included as binder        |
| 2-WB4-29<br><br>Layer: 2 | 2410730-029A | Textured Ceiling-Kitchen (M-17)                  | 2                           | ND | ND | ND | ND | ND | Texture. Paint included as binder        |
| 1-WB3-30<br><br>Layer: 1 | 2410730-030A | Brown WB/JC-Stairwell Outside (M-17)             | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 8-FC1-31<br><br>Layer: 1 | 2410730-031A | Light Brown Layered Roll Flooring-Kitchen (M-20) | ND                          | ND | ND | ND | ND | ND | Yellow vinyl                             |
| 8-FC1-31<br><br>Layer: 2 | 2410730-031A | Light Brown Layered Roll Flooring-Kitchen (M-20) | ND                          | ND | ND | ND | ND | ND | Backing                                  |

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

Client Name: **Terracon**Job Number: **2410730**Project Name: **Willow Branch Apartments**Project Number: **HN247281A**

| Client ID             | AES ID       | Location                                         | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|-----------------------|--------------|--------------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                       |              |                                                  | CH                          | AM | CR | AN | TR | AC |                                          |
| 8-FC1-31<br>Layer: 1  | 2410730-031B | Light Brown Layered Roll Flooring-Kitchen (M-20) | ND                          | ND | ND | ND | ND | ND | Brown vinyl                              |
| 8-FC1-31<br>Layer: 2  | 2410730-031B | Light Brown Layered Roll Flooring-Kitchen (M-20) | ND                          | ND | ND | ND | ND | ND | Backing                                  |
| 1-WB3-32<br>Layer: 1  | 2410730-032A | WB/JC-Bedroom (M-20)                             | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 11-CA2-33<br>Layer: 1 | 2410730-033A | Kitchen Counter Caulk (M-20)                     | ND                          | ND | ND | ND | ND | ND | Paint included as binder                 |
| 2-WB4-34<br>Layer: 1  | 2410730-034A | Textured Ceiling (M-20)                          | 2                           | ND | ND | ND | ND | ND | Texture. Paint included as binder        |
| 2-WB4-34<br>Layer: 2  | 2410730-034A | Textured Ceiling (M-20)                          | ND                          | ND | ND | ND | ND | ND |                                          |

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QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID                | AES ID       | Location                        | Asbestos Mineral Percentage |    |    |    |    |    | Comments                          |
|--------------------------|--------------|---------------------------------|-----------------------------|----|----|----|----|----|-----------------------------------|
|                          |              |                                 | CH                          | AM | CR | AN | TR | AC |                                   |
| 2-WB4-34<br><br>Layer: 3 | 2410730-034A | Textured Ceiling (M-20)         | ND                          | ND | ND | ND | ND | ND |                                   |
| 7-WB4-35<br><br>Layer: 1 | 2410730-035A | Textured Bathroom Wall-(P-12)   | ND                          | ND | ND | ND | ND | ND | Texture. Paint included as binder |
| 7-WB4-35<br><br>Layer: 2 | 2410730-035A | Textured Bathroom Wall-(P-12)   | ND                          | ND | ND | ND | ND | ND |                                   |
| 7-WB4-35<br><br>Layer: 3 | 2410730-035A | Textured Bathroom Wall-(P-12)   | 2                           | ND | ND | ND | ND | ND | Joint compound                    |
| 2-WB4-36<br><br>Layer: 1 | 2410730-036A | Textured Ceiling-Hallway (P-12) | 2                           | ND | ND | ND | ND | ND | Texture. Paint included as binder |
| 2-WB4-36<br><br>Layer: 2 | 2410730-036A | Textured Ceiling-Hallway (P-12) | ND                          | ND | ND | ND | ND | ND |                                   |

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Svetlana Arkhipov

QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID                | AES ID       | Location                                 | Asbestos Mineral Percentage |    |    |    |    |    | Comments       |
|--------------------------|--------------|------------------------------------------|-----------------------------|----|----|----|----|----|----------------|
|                          |              |                                          | CH                          | AM | CR | AN | TR | AC |                |
| 2-WB4-36<br><br>Layer: 3 | 2410730-036A | Textured Ceiling-Hallway (P-12)          | ND                          | ND | ND | ND | ND | ND |                |
| 1-WB3-37<br><br>Layer: 1 | 2410730-037A | WB/JC Hallway (P-12)                     | 2                           | ND | ND | ND | ND | ND | Joint compound |
| 8-FC1-38<br><br>Layer: 1 | 2410730-038A | Light Brown Roll Flooring-Kitchen (P-12) | ND                          | ND | ND | ND | ND | ND | Vinyl          |
| 8-FC1-38<br><br>Layer: 2 | 2410730-038A | Light Brown Roll Flooring-Kitchen (P-12) | ND                          | ND | ND | ND | ND | ND | Backing        |
| 8-FC1-38<br><br>Layer: 3 | 2410730-038A | Light Brown Roll Flooring-Kitchen (P-12) | ND                          | ND | ND | ND | ND | ND | Glue           |
| 8-FC1-38<br><br>Layer: 4 | 2410730-038A | Light Brown Roll Flooring-Kitchen (P-12) | ND                          | ND | ND | ND | ND | ND | Compound       |

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophyllite

For comments on the samples, see the individual analysis sheets.

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID                 | AES ID       | Location                                     | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|---------------------------|--------------|----------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                           |              |                                              | CH                          | AM | CR | AN | TR | AC |                                          |
| 10-CA2-39<br><br>Layer: 1 | 2410730-039A | Brown/Black Exterior Door Caulk-Patio (P-12) | ND                          | ND | ND | ND | ND | ND | Caulk. Paint included as binder          |
| 10-CA2-39<br><br>Layer: 2 | 2410730-039A | Brown/Black Exterior Door Caulk-Patio (P-12) | 2                           | ND | ND | ND | ND | ND | Glazing                                  |
| 11-CA2-40<br><br>Layer: 1 | 2410730-040A | White Kitchen Counter Caulk-(P-12)           | ND                          | ND | ND | ND | ND | ND |                                          |
| 1-WB3-41<br><br>Layer: 1  | 2410730-041A | Brown WB/JC-Stairwell Outside (P-12)         | ND                          | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 1-WB3-41<br><br>Layer: 2  | 2410730-041A | Brown WB/JC-Stairwell Outside (P-12)         | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 1-WB3-42<br><br>Layer: 1  | 2410730-042A | WB/JC-Kitchen (P-9)                          | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophyllite

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina



## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID            | AES ID       | Location                          | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|----------------------|--------------|-----------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                      |              |                                   | CH                          | AM | CR | AN | TR | AC |                                          |
| 1-WB3-43<br>Layer: 1 | 2410730-043A | WB/JC-Hallway (P-9)               | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 2-WB4-44<br>Layer: 1 | 2410730-044A | Textured Ceiling-Hallway (P-9)    | 2                           | ND | ND | ND | ND | ND | Texture. Paint included as binder        |
| 3-CA1-45<br>Layer: 1 | 2410730-045A | Beige Exterior Window Caulk (P-9) | ND                          | ND | ND | ND | ND | ND | Paint included as binder                 |
| 1-WB3-46<br>Layer: 1 | 2410730-046A | WB/JC-Kitchen (P-15)              | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 1-WB3-46<br>Layer: 2 | 2410730-046A | WB/JC-Kitchen (P-15)              | ND                          | ND | ND | ND | ND | ND |                                          |
| 1-WB3-47<br>Layer: 1 | 2410730-047A | WB/JC-Laundry Room (P-15)         | ND                          | ND | ND | ND | ND | ND | Paint                                    |

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID            | AES ID       | Location                                 | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|----------------------|--------------|------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                      |              |                                          | CH                          | AM | CR | AN | TR | AC |                                          |
| 2-WB4-48<br>Layer: 1 | 2410730-048A | Textured Ceiling (P-15)                  | ND                          | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 2-WB4-48<br>Layer: 2 | 2410730-048A | Textured Ceiling (P-15)                  | ND                          | ND | ND | ND | ND | ND |                                          |
| 2-WB4-48<br>Layer: 3 | 2410730-048A | Textured Ceiling (P-15)                  | 2                           | ND | ND | ND | ND | ND | Joint compound                           |
| 8-FC1-49<br>Layer: 1 | 2410730-049A | Light Brown Roll Flooring-Kitchen (P-15) | ND                          | ND | ND | ND | ND | ND | Vinyl                                    |
| 8-FC1-49<br>Layer: 2 | 2410730-049A | Light Brown Roll Flooring-Kitchen (P-15) | ND                          | ND | ND | ND | ND | ND | Glue                                     |
| 8-FC1-49<br>Layer: 3 | 2410730-049A | Light Brown Roll Flooring-Kitchen (P-15) | ND                          | ND | ND | ND | ND | ND | Leveling compound                        |

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID             | AES ID       | Location                           | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|-----------------------|--------------|------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                       |              |                                    | CH                          | AM | CR | AN | TR | AC |                                          |
| 5-RF3-50<br>Layer: 1  | 2410730-050A | Roofing Shingle With Felt-(P-15)   | ND                          | ND | ND | ND | ND | ND |                                          |
| 5-RF3-50<br>Layer: 2  | 2410730-050A | Roofing Shingle With Felt-(P-15)   | ND                          | ND | ND | ND | ND | ND |                                          |
| 5-RF3-50<br>Layer: 3  | 2410730-050A | Roofing Shingle With Felt-(P-15)   | ND                          | ND | ND | ND | ND | ND |                                          |
| 11-CA2-51<br>Layer: 1 | 2410730-051A | White Kitchen Counter Caulk-(P-15) | ND                          | ND | ND | ND | ND | ND |                                          |
| 11-CA2-52<br>Layer: 1 | 2410730-052A | White Kitchen Counter Caulk-(P-5)  | ND                          | ND | ND | ND | ND | ND |                                          |
| 1-WB3-53<br>Layer: 1  | 2410730-053A | WB/JC-Kitchen (P-5)                | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |

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QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID            | AES ID       | Location                                            | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|----------------------|--------------|-----------------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                      |              |                                                     | CH                          | AM | CR | AN | TR | AC |                                          |
| 2-WB4-54<br>Layer: 1 | 2410730-054A | Textured Ceiling-Living Room (P-5)                  | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 2-WB4-54<br>Layer: 2 | 2410730-054A | Textured Ceiling-Living Room (P-5)                  | ND                          | ND | ND | ND | ND | ND |                                          |
| 1-WB3-55<br>Layer: 1 | 2410730-055A | Wallboard & Joint Compound, Living Room (H-28)      | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 1-WB3-55<br>Layer: 2 | 2410730-055A | Wallboard & Joint Compound, Living Room (H-28)      | ND                          | ND | ND | ND | ND | ND |                                          |
| 6-FC1-56<br>Layer: 1 | 2410730-056A | Dark Brown Wood Roll Flooring, Kitchen Closet (H-2) | ND                          | ND | ND | ND | ND | ND | Vinyl                                    |
| 6-FC1-56<br>Layer: 2 | 2410730-056A | Dark Brown Wood Roll Flooring, Kitchen Closet (H-2) | ND                          | ND | ND | ND | ND | ND | Glue                                     |

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

# Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID                | AES ID       | Location                                            | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|--------------------------|--------------|-----------------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                          |              |                                                     | CH                          | AM | CR | AN | TR | AC |                                          |
| 6-FC1-56<br><br>Layer: 3 | 2410730-056A | Dark Brown Wood Roll Flooring, Kitchen Closet (H-2) | ND                          | ND | ND | ND | ND | ND | Compound                                 |
| 2-WB4-57<br><br>Layer: 1 | 2410730-057A | Textured Ceiling, Living Room (H-28)                | 2                           | ND | ND | ND | ND | ND | Texture. Paint included as binder        |
| 7-WB4-58<br><br>Layer: 1 | 2410730-058A | Textured Wall, Bathroom (H-28)                      | ND                          | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 7-WB4-58<br><br>Layer: 2 | 2410730-058A | Textured Wall, Bathroom (H-28)                      | ND                          | ND | ND | ND | ND | ND |                                          |
| 7-WB4-58<br><br>Layer: 3 | 2410730-058A | Textured Wall, Bathroom (H-28)                      | ND                          | ND | ND | ND | ND | ND |                                          |
| 9-SC6-59<br><br>Layer: 1 | 2410730-059A | Black Sink Undercoat, Kitchen (H-28)                | 5                           | ND | ND | ND | ND | ND | Black mastic                             |

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Microanalyst:

Svetlana Arkhipov

QC Analyst:

Yelena Khanina

# Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID                 | AES ID       | Location                                   | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|---------------------------|--------------|--------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                           |              |                                            | CH                          | AM | CR | AN | TR | AC |                                          |
| 1-WB3-60<br><br>Layer: 1  | 2410730-060A | Wallboard & Joint Compound, Kitchen (H-28) | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 11-CA2-61<br><br>Layer: 1 | 2410730-061A | White Caulk, Bathroom (H-28)               | ND                          | ND | ND | ND | ND | ND |                                          |
| 7-WB4-62<br><br>Layer: 1  | 2410730-062A | Texture Wall (H-14)                        | ND                          | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 7-WB4-62<br><br>Layer: 2  | 2410730-062A | Texture Wall (H-14)                        | ND                          | ND | ND | ND | ND | ND |                                          |
| 12-WB5-63<br><br>Layer: 1 | 2410730-063A | Popcorn Ceiling, Living Room (H-14)        | 2                           | ND | ND | ND | ND | ND | Texture. Paint included as binder        |
| 12-WB5-64<br><br>Layer: 1 | 2410730-064A | Popcorn Ceiling, Hallway (H-14)            | 2                           | ND | ND | ND | ND | ND | Texture. Paint included as binder        |

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Microanalyst:

Svetlana Arkhipov

QC Analyst:

Yelena Khanina



## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID             | AES ID       | Location                                          | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|-----------------------|--------------|---------------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                       |              |                                                   | CH                          | AM | CR | AN | TR | AC |                                          |
| 12-WB5-65<br>Layer: 1 | 2410730-065A | Popcorn Ceiling, Bedroom (H-14)                   | 2                           | ND | ND | ND | ND | ND | Texture. Paint included as binder        |
| 12-WB5-65<br>Layer: 2 | 2410730-065A | Popcorn Ceiling, Bedroom (H-14)                   | ND                          | ND | ND | ND | ND | ND |                                          |
| 1-WB3-66<br>Layer: 1  | 2410730-066A | Wallboard & Joint Compound, Hallway (H-14)        | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 8-FC1-67<br>Layer: 1  | 2410730-067A | Light Brown Roll Flooring, Bathroom Closet (H-14) | ND                          | ND | ND | ND | ND | ND | Vinyl                                    |
| 8-FC1-67<br>Layer: 2  | 2410730-067A | Light Brown Roll Flooring, Bathroom Closet (H-14) | ND                          | ND | ND | ND | ND | ND | Glue                                     |
| 1-WB3-68<br>Layer: 1  | 2410730-068A | Wallboard & Joint Compound, Hall Closet (L-1)     | ND                          | ND | ND | ND | ND | ND | Drywall tape. Paint included as binder   |

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID             | AES ID       | Location                                        | Asbestos Mineral Percentage |    |    |    |    |    | Comments                        |
|-----------------------|--------------|-------------------------------------------------|-----------------------------|----|----|----|----|----|---------------------------------|
|                       |              |                                                 | CH                          | AM | CR | AN | TR | AC |                                 |
| 6-FC1-69<br>Layer: 1  | 2410730-069A | Dark Brown Roll Flooring, Hall Closet (L-1)     | ND                          | ND | ND | ND | ND | ND | Vinyl                           |
| 6-FC1-69<br>Layer: 2  | 2410730-069A | Dark Brown Roll Flooring, Hall Closet (L-1)     | ND                          | ND | ND | ND | ND | ND | Glue                            |
| 2-WB4-70<br>Layer: 1  | 2410730-070A | Textured Ceiling, Bathroom (L-1)                | ND                          | ND | ND | ND | ND | ND | Paint                           |
| 1-WB3-71<br>Layer: 1  | 2410730-071A | Wallboard & Joint Compound, Upstairs Hall (L-1) | ND                          | ND | ND | ND | ND | ND | Paint                           |
| 10-CA2-72<br>Layer: 1 | 2410730-072A | Exterior Black & Pink Door Caulk (L-1)          | ND                          | ND | ND | ND | ND | ND | Caulk. Paint included as binder |
| 10-CA2-72<br>Layer: 2 | 2410730-072A | Exterior Black & Pink Door Caulk (L-1)          | 3                           | ND | ND | ND | ND | ND | Glazing                         |

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophyllite

For comments on the samples, see the individual analysis sheets.

ND = None Detected

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID            | AES ID       | Location                                      | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|----------------------|--------------|-----------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                      |              |                                               | CH                          | AM | CR | AN | TR | AC |                                          |
| 3-CA1-73<br>Layer: 1 | 2410730-073A | Exterior Black & Pink Window Caulk (L-1)      | ND                          | ND | ND | ND | ND | ND | Caulk. Paint included as binder          |
| 3-CA1-73<br>Layer: 2 | 2410730-073A | Exterior Black & Pink Window Caulk (L-1)      | 3                           | ND | ND | ND | ND | ND | Glazing                                  |
| 5-RF3-74<br>Layer: 1 | 2410730-074A | Roof Shingle With Felt (L-1)                  | ND                          | ND | ND | ND | ND | ND |                                          |
| 5-RF3-74<br>Layer: 2 | 2410730-074A | Roof Shingle With Felt (L-1)                  | ND                          | ND | ND | ND | ND | ND |                                          |
| 1-WB3-75<br>Layer: 1 | 2410730-075A | Wallboard & Joint Compound, Living Room (L-4) | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 1-WB3-76<br>Layer: 1 | 2410730-076A | Wallboard & Joint Compound, Kitchen (L-4)     | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |

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ND = None Detected

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

# Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID             | AES ID       | Location                                           | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|-----------------------|--------------|----------------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                       |              |                                                    | CH                          | AM | CR | AN | TR | AC |                                          |
| 2-WB4-77<br>Layer: 1  | 2410730-077A | Textured Ceiling, Upstairs Hall (L-4)              | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 2-WB4-77<br>Layer: 2  | 2410730-077A | Textured Ceiling, Upstairs Hall (L-4)              | ND                          | ND | ND | ND | ND | ND |                                          |
| 2-WB4-77<br>Layer: 3  | 2410730-077A | Textured Ceiling, Upstairs Hall (L-4)              | ND                          | ND | ND | ND | ND | ND |                                          |
| 13-FC1-78<br>Layer: 1 | 2410730-078A | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Gray vinyl                               |
| 13-FC1-78<br>Layer: 2 | 2410730-078A | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Backing                                  |
| 13-FC1-78<br>Layer: 1 | 2410730-078B | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Beige vinyl                              |

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophyllite

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Microanalyst:

Svetlana Arkhipov

QC Analyst:

Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID             | AES ID       | Location                                           | Asbestos Mineral Percentage |    |    |    |    |    | Comments    |
|-----------------------|--------------|----------------------------------------------------|-----------------------------|----|----|----|----|----|-------------|
|                       |              |                                                    | CH                          | AM | CR | AN | TR | AC |             |
| 13-FC1-78<br>Layer: 2 | 2410730-078B | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Backing     |
| 13-FC1-78<br>Layer: 1 | 2410730-078C | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Tan vinyl   |
| 13-FC1-78<br>Layer: 2 | 2410730-078C | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Backing     |
| 13-FC1-78<br>Layer: 1 | 2410730-078D | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Brown vinyl |
| 13-FC1-78<br>Layer: 2 | 2410730-078D | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Backing     |
| 13-FC1-78<br>Layer: 3 | 2410730-078D | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Wood        |

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Svetlana Arkhipov

QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID             | AES ID       | Location                                           | Asbestos Mineral Percentage |    |    |    |    |    | Comments    |
|-----------------------|--------------|----------------------------------------------------|-----------------------------|----|----|----|----|----|-------------|
|                       |              |                                                    | CH                          | AM | CR | AN | TR | AC |             |
| 13-FC1-79<br>Layer: 1 | 2410730-079A | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Gray vinyl  |
| 13-FC1-79<br>Layer: 2 | 2410730-079A | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Backing     |
| 13-FC1-79<br>Layer: 1 | 2410730-079B | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Beige vinyl |
| 13-FC1-79<br>Layer: 2 | 2410730-079B | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Backing     |
| 13-FC1-79<br>Layer: 1 | 2410730-079C | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Tan vinyl   |
| 13-FC1-79<br>Layer: 2 | 2410730-079C | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Backing     |

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Yelena Khanina



# Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID             | AES ID       | Location                                           | Asbestos Mineral Percentage |    |    |    |    |    | Comments          |
|-----------------------|--------------|----------------------------------------------------|-----------------------------|----|----|----|----|----|-------------------|
|                       |              |                                                    | CH                          | AM | CR | AN | TR | AC |                   |
| 13-FC1-79<br>Layer: 1 | 2410730-079D | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Brown vinyl       |
| 13-FC1-79<br>Layer: 2 | 2410730-079D | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Backing           |
| 13-FC1-79<br>Layer: 3 | 2410730-079D | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Glue              |
| 13-FC1-79<br>Layer: 4 | 2410730-079D | White Square Pattern Layred Roll Flooring, Kitchen | ND                          | ND | ND | ND | ND | ND | Leveling compound |
| 13-FC1-80<br>Layer: 1 | 2410730-080A | White Square Pattern Layred Roll Flooring, Laundry | ND                          | ND | ND | ND | ND | ND | Gray vinyl        |
| 13-FC1-80<br>Layer: 2 | 2410730-080A | White Square Pattern Layred Roll Flooring, Laundry | ND                          | ND | ND | ND | ND | ND | Backing           |

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QC Analyst:



Yelena Khanina

# Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID             | AES ID       | Location                                           | Asbestos Mineral Percentage |    |    |    |    |    | Comments    |
|-----------------------|--------------|----------------------------------------------------|-----------------------------|----|----|----|----|----|-------------|
|                       |              |                                                    | CH                          | AM | CR | AN | TR | AC |             |
| 13-FC1-80<br>Layer: 1 | 2410730-080B | White Square Pattern Layred Roll Flooring, Laundry | ND                          | ND | ND | ND | ND | ND | Beige vinyl |
| 13-FC1-80<br>Layer: 2 | 2410730-080B | White Square Pattern Layred Roll Flooring, Laundry | ND                          | ND | ND | ND | ND | ND | Backing     |
| 13-FC1-80<br>Layer: 1 | 2410730-080C | White Square Pattern Layred Roll Flooring, Laundry | ND                          | ND | ND | ND | ND | ND | Tan vinyl   |
| 13-FC1-80<br>Layer: 2 | 2410730-080C | White Square Pattern Layred Roll Flooring, Laundry | ND                          | ND | ND | ND | ND | ND | Backing     |
| 13-FC1-80<br>Layer: 1 | 2410730-080D | White Square Pattern Layred Roll Flooring, Laundry | ND                          | ND | ND | ND | ND | ND | Brown vinyl |
| 13-FC1-80<br>Layer: 2 | 2410730-080D | White Square Pattern Layred Roll Flooring, Laundry | ND                          | ND | ND | ND | ND | ND | Backing     |

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID                 | AES ID       | Location                                           | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|---------------------------|--------------|----------------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                           |              |                                                    | CH                          | AM | CR | AN | TR | AC |                                          |
| 13-FC1-80<br><br>Layer: 3 | 2410730-080D | White Square Pattern Layred Roll Flooring, Laundry | ND                          | ND | ND | ND | ND | ND | Glue                                     |
| 13-FC1-80<br><br>Layer: 4 | 2410730-080D | White Square Pattern Layred Roll Flooring, Laundry | ND                          | ND | ND | ND | ND | ND | Leveling compound                        |
| 1-WB3-81<br><br>Layer: 1  | 2410730-081A | Wallboard & Joint Compound, Dining Room (K-16)     | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 1-WB3-81<br><br>Layer: 2  | 2410730-081A | Wallboard & Joint Compound, Dining Room (K-16)     | ND                          | ND | ND | ND | ND | ND |                                          |
| 1-WB3-81<br><br>Layer: 3  | 2410730-081A | Wallboard & Joint Compound, Dining Room (K-16)     | ND                          | ND | ND | ND | ND | ND |                                          |
| 2-WB4-82<br><br>Layer: 1  | 2410730-082A | Textured Ceiling, Dining Room (K-16)               | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

## Bulk Sample Summary Report

Report Date: 25-Oct-24

Client Name: **Terracon**Job Number: **2410730**Project Name: **Willow Branch Apartments**Project Number: **HN247281A**

| Client ID             | AES ID       | Location                                           | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                                                      |
|-----------------------|--------------|----------------------------------------------------|-----------------------------|----|----|----|----|----|-------------------------------------------------------------------------------|
|                       |              |                                                    | CH                          | AM | CR | AN | TR | AC |                                                                               |
| 1-WB3-83<br>Layer: 1  | 2410730-083A | Wallboard & Joint Compound, Stairwell Outside Unit | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder                                      |
| 2-WB4-84<br>Layer: 1  | 2410730-084A | Textured Ceiling, Stairwell Outside Unit (K-16)    | ND                          | ND | ND | ND | ND | ND | Drywall tape with paint. Insufficient amount of joint compound to be analyzed |
| 2-WB4-84<br>Layer: 2  | 2410730-084A | Textured Ceiling, Stairwell Outside Unit (K-16)    | ND                          | ND | ND | ND | ND | ND | Wallboard                                                                     |
| 2-WB4-85<br>Layer: 1  | 2410730-085A | Textured Ceiling, Hallway (K-3)                    | 2                           | ND | ND | ND | ND | ND | Texture. Paint included as binder                                             |
| 1-WB3-86<br>Layer: 1  | 2410730-086A | Wallboard & Joint Compound Hallway (K-3)           | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder                                      |
| 11-CA2-87<br>Layer: 1 | 2410730-087A | White Kitchen Caulk (K-3)                          | ND                          | ND | ND | ND | ND | ND |                                                                               |

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

# Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID                 | AES ID       | Location                                        | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|---------------------------|--------------|-------------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                           |              |                                                 | CH                          | AM | CR | AN | TR | AC |                                          |
| 13-MG5-88<br><br>Layer: 1 | 2410730-088A | Black Mastic Under Carpet Concrete, Main Office | 5                           | ND | ND | ND | ND | ND | Black mastic                             |
| 13-MG5-89<br><br>Layer: 1 | 2410730-089A | Black Mastic Under Carpet Concrete, Main Office | 5                           | ND | ND | ND | ND | ND | Black mastic                             |
| 4-SC1-90<br><br>Layer: 1  | 2410730-090A | Exterior Window Glaze, Main Office              | ND                          | ND | ND | ND | ND | ND | Paint included as binder                 |
| 4-SC1-91<br><br>Layer: 1  | 2410730-091A | Exterior Window Glaze, Main Office              | ND                          | ND | ND | ND | ND | ND | Paint included as binder                 |
| 1-WB3-92<br><br>Layer: 1  | 2410730-092A | Wallboard & Joint Compound, Hallway (J-1)       | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 7-WB4-93<br><br>Layer: 1  | 2410730-093A | Textured Wall, Bathroom (J-1)                   | ND                          | ND | ND | ND | ND | ND | Texture. Paint included as binder        |

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophyllite

For comments on the samples, see the individual analysis sheets.

ND = None Detected

Eurofins-Atlanta is accredited by NIST's National Voluntary Laboratory Accreditation Program (NVLAP) for Polarized Light Microscopy (PLM) analysis, Lab Code 102082-0. All analyses performed in accordance with EPA "Interim Method for the Determination of Asbestos in Bulk Insulation Samples" (EPA 600/M4-82-020), 1982 as found in 40 CFR, Part 763, Appendix E to Subpart E and "Method for the Determination of Asbestos in Bulk Building Materials" (EPA/600/R-93/116), 1993.

These test results apply only to those samples actually tested, as submitted by the client. All percentages are reported by visually estimated volume.

PLM is not consistently reliable in detecting small concentrations of asbestos in floor tiles and similar nonfriable materials, quantitative TEM is currently the only method that can be used to determine conclusive asbestos content. Interpretation and use of test results are the client's responsibility.

Laboratory liability is limited to the cost of analysis. This report must not be used to claim, and does not imply product certification, approval, or endorsement by NVLAP or any agency of the Federal Government.

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Microanalyst:

Svetlana Arkhipov

QC Analyst:

Yelena Khanina

# Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID                 | AES ID       | Location                                    | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|---------------------------|--------------|---------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                           |              |                                             | CH                          | AM | CR | AN | TR | AC |                                          |
| 7-WB4-93<br><br>Layer: 2  | 2410730-093A | Textured Wall, Bathroom (J-1)               | ND                          | ND | ND | ND | ND | ND | Wallpaper                                |
| 1-WB3-94<br><br>Layer: 1  | 2410730-094A | Wallboard & Joint Compound, Bedroom 1 (P-6) | ND                          | ND | ND | ND | ND | ND | Paint                                    |
| 1-WB3-95<br><br>Layer: 1  | 2410730-095A | Wallboard & Joint Compound, Bedroom 2 (P-6) | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 2-WB4-96<br><br>Layer: 1  | 2410730-096A | Textured Ceiling, Kitchen (P-6)             | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 7-WB4-97<br><br>Layer: 1  | 2410730-097A | Textured Wall, Kitchen (P-6)                | ND                          | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |
| 12-WB5-98<br><br>Layer: 1 | 2410730-098A | Popcorn Ceiling, Kitchen (G-6)              | 2                           | ND | ND | ND | ND | ND | Texture. Paint included as binder        |

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophyllite

For comments on the samples, see the individual analysis sheets.

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Microanalyst:

Svetlana Arkhipov

QC Analyst:

Yelena Khanina



## Bulk Sample Summary Report

Report Date: 25-Oct-24

|               |                                 |                 |                  |
|---------------|---------------------------------|-----------------|------------------|
| Client Name:  | <b>Terracon</b>                 | Job Number:     | <b>2410730</b>   |
| Project Name: | <b>Willow Branch Apartments</b> | Project Number: | <b>HN247281A</b> |

| Client ID                  | AES ID       | Location                                 | Asbestos Mineral Percentage |    |    |    |    |    | Comments                                 |
|----------------------------|--------------|------------------------------------------|-----------------------------|----|----|----|----|----|------------------------------------------|
|                            |              |                                          | CH                          | AM | CR | AN | TR | AC |                                          |
| 12-WB5-99<br><br>Layer: 1  | 2410730-099A | Popcorn Ceiling, Hallway (G-6)           | 2                           | ND | ND | ND | ND | ND | Texture. Paint included as binder        |
| 12-WB5-100<br><br>Layer: 1 | 2410730-100A | Popcorn Ceiling, Hallway 2nd Floor (G-6) | 2                           | ND | ND | ND | ND | ND | Texture. Paint included as binder        |
| 7-WB3-93<br><br>Layer: 1   | 2410730-101A |                                          | 2                           | ND | ND | ND | ND | ND | Joint compound. Paint included as binder |

Note: CH=chrysotile, AM=amosite, CR=crocidolite, AC=actinolite, TR=tremolite, AN=anthophyllite

For comments on the samples, see the individual analysis sheets.

ND = None Detected

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Microanalyst:



Svetlana Arkhipov

QC Analyst:



Yelena Khanina

End of Report

# ANALYTICAL REPORT

## PREPARED FOR

Attn: Todd Peterman  
Terracon Consultants Inc  
514 Hillcrest Industrial Blvd.  
Macon, Georgia 31204

Generated 10/16/2024 11:58:24 AM

## JOB DESCRIPTION

Willow Branch Apartments

## JOB NUMBER

705-9758-1

## Job Notes

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing Southeast, LLC Project Manager.

## Authorization



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Authorized for release by  
Christopher Pafford, Customer Service Manager  
[christopher.pafford@et.eurofinsus.com](mailto:christopher.pafford@et.eurofinsus.com)  
(770)457-8177



# Table of Contents

|                                 |    |
|---------------------------------|----|
| Cover Page . . . . .            | 1  |
| Table of Contents . . . . .     | 3  |
| Definitions/Glossary . . . . .  | 4  |
| Chain of Custody . . . . .      | 5  |
| Client Sample Results . . . . . | 8  |
| Lab Chronicle . . . . .         | 47 |
| Certification Summary . . . . . | 60 |
| Receipt Checklists . . . . .    | 61 |
| End Of Report . . . . .         | 62 |

## Definitions/Glossary

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

### Glossary

| Abbreviation   | These commonly used abbreviations may or may not be present in this report.                                 |
|----------------|-------------------------------------------------------------------------------------------------------------|
| ☼              | Listed under the "D" column to designate that the result is reported on a dry weight basis                  |
| %R             | Percent Recovery                                                                                            |
| CFL            | Contains Free Liquid                                                                                        |
| CFU            | Colony Forming Unit                                                                                         |
| CNF            | Contains No Free Liquid                                                                                     |
| DER            | Duplicate Error Ratio (normalized absolute difference)                                                      |
| Dil Fac        | Dilution Factor                                                                                             |
| DL             | Detection Limit (DoD/DOE)                                                                                   |
| DL, RA, RE, IN | Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample |
| DLC            | Decision Level Concentration (Radiochemistry)                                                               |
| EDL            | Estimated Detection Limit (Dioxin)                                                                          |
| LOD            | Limit of Detection (DoD/DOE)                                                                                |
| LOQ            | Limit of Quantitation (DoD/DOE)                                                                             |
| MCL            | EPA recommended "Maximum Contaminant Level"                                                                 |
| MDA            | Minimum Detectable Activity (Radiochemistry)                                                                |
| MDC            | Minimum Detectable Concentration (Radiochemistry)                                                           |
| MDL            | Method Detection Limit                                                                                      |
| ML             | Minimum Level (Dioxin)                                                                                      |
| MPN            | Most Probable Number                                                                                        |
| MQL            | Method Quantitation Limit                                                                                   |
| NC             | Not Calculated                                                                                              |
| ND             | Not Detected at the reporting limit (or MDL or EDL if shown)                                                |
| NEG            | Negative / Absent                                                                                           |
| POS            | Positive / Present                                                                                          |
| PQL            | Practical Quantitation Limit                                                                                |
| PRES           | Presumptive                                                                                                 |
| QC             | Quality Control                                                                                             |
| RER            | Relative Error Ratio (Radiochemistry)                                                                       |
| RL             | Reporting Limit or Requested Limit (Radiochemistry)                                                         |
| RPD            | Relative Percent Difference, a measure of the relative difference between two points                        |
| TEF            | Toxicity Equivalent Factor (Dioxin)                                                                         |
| TEQ            | Toxicity Equivalent Quotient (Dioxin)                                                                       |
| TNTC           | Too Numerous To Count                                                                                       |





Environment Testing

CHAIN OF CUSTODY

|                                                                                                                                                                                                                                                                                                                                                                                                               |             |                                        |       |                                     |           |                         |    |                                         |  |  |  |  |  |  |  |  |  |  |  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------|-------|-------------------------------------|-----------|-------------------------|----|-----------------------------------------|--|--|--|--|--|--|--|--|--|--|--|
| COMPANY: Terracon                                                                                                                                                                                                                                                                                                                                                                                             |             | ADDRESS: 514 Hillcrest Industrial Blvd |       | ANALYSIS REQUESTED                  |           |                         |    |                                         |  |  |  |  |  |  |  |  |  |  |  |
| PHONE: 478-757-1606                                                                                                                                                                                                                                                                                                                                                                                           |             | EMAIL: Todd.Peterson@terracon.com      |       |                                     |           |                         |    |                                         |  |  |  |  |  |  |  |  |  |  |  |
| SAMPLED BY: Anthony Whipple & David Baird                                                                                                                                                                                                                                                                                                                                                                     |             | SIGNATURE: David Baird                 |       |                                     |           |                         |    |                                         |  |  |  |  |  |  |  |  |  |  |  |
| #                                                                                                                                                                                                                                                                                                                                                                                                             | SAMPLE ID   | SAMPLED:                               |       | GRAB                                | COMPOSITE | MATRIX<br>(see codes)   | Pb | PRESERVATION (see codes)                |  |  |  |  |  |  |  |  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                               |             | DATE                                   | TIME  |                                     |           |                         |    |                                         |  |  |  |  |  |  |  |  |  |  |  |
| 1                                                                                                                                                                                                                                                                                                                                                                                                             | WBAG / A-1S | 10/7                                   | 10:04 |                                     | ✓         |                         | ✓  |                                         |  |  |  |  |  |  |  |  |  |  |  |
| 2                                                                                                                                                                                                                                                                                                                                                                                                             | WBAG / A-2S | 10/7                                   | 10:08 |                                     | ✓         |                         | ✓  |                                         |  |  |  |  |  |  |  |  |  |  |  |
| 3                                                                                                                                                                                                                                                                                                                                                                                                             | WBAG / B-1S | 10/7                                   | 10:11 |                                     | ✓         |                         | ✓  |                                         |  |  |  |  |  |  |  |  |  |  |  |
| 4                                                                                                                                                                                                                                                                                                                                                                                                             | WBAG / D-1S | 10/7                                   | 10:15 |                                     | ✓         |                         | ✓  |                                         |  |  |  |  |  |  |  |  |  |  |  |
| 5                                                                                                                                                                                                                                                                                                                                                                                                             | WBAP / A-1S | 10/7                                   | 10:22 |                                     | ✓         |                         | ✓  |                                         |  |  |  |  |  |  |  |  |  |  |  |
| 6                                                                                                                                                                                                                                                                                                                                                                                                             | WBAP / A-2S | 10/7                                   | 10:26 |                                     | ✓         |                         | ✓  |                                         |  |  |  |  |  |  |  |  |  |  |  |
| 7                                                                                                                                                                                                                                                                                                                                                                                                             | WBAP / A-3S | 10/7                                   | 10:28 |                                     | ✓         |                         | ✓  |                                         |  |  |  |  |  |  |  |  |  |  |  |
| 8                                                                                                                                                                                                                                                                                                                                                                                                             | WBAP / D-1S | 10/7                                   | 10:33 |                                     | ✓         |                         | ✓  |                                         |  |  |  |  |  |  |  |  |  |  |  |
| 9                                                                                                                                                                                                                                                                                                                                                                                                             | WBAP / C-3S | 10/7                                   | 10:45 |                                     | ✓         |                         | ✓  |                                         |  |  |  |  |  |  |  |  |  |  |  |
| 10                                                                                                                                                                                                                                                                                                                                                                                                            | WBAP / C-2S | 10/7                                   | 10:48 |                                     | ✓         |                         | ✓  |                                         |  |  |  |  |  |  |  |  |  |  |  |
| 11                                                                                                                                                                                                                                                                                                                                                                                                            | WBAP / C-1S | 10/7                                   | 10:53 |                                     | ✓         |                         | ✓  |                                         |  |  |  |  |  |  |  |  |  |  |  |
| 12                                                                                                                                                                                                                                                                                                                                                                                                            | WBAP / B-1S | 10/7                                   | 10:57 |                                     | ✓         |                         | ✓  |                                         |  |  |  |  |  |  |  |  |  |  |  |
| 13                                                                                                                                                                                                                                                                                                                                                                                                            | WBAN / B-1S | 10/7                                   | 11:06 |                                     | ✓         |                         | ✓  |                                         |  |  |  |  |  |  |  |  |  |  |  |
| 14                                                                                                                                                                                                                                                                                                                                                                                                            | WBAN / A-1S | 10/7                                   | 11:10 |                                     | ✓         |                         | ✓  |                                         |  |  |  |  |  |  |  |  |  |  |  |
| RELINQUISHED BY: David Baird 10/9 12:00                                                                                                                                                                                                                                                                                                                                                                       |             | DATE/TIME: 10/9 12:00                  |       | RECEIVED BY: [Signature] 10-9 10:24 |           | DATE/TIME: 1009 24 1210 |    | PROJECT INFORMATION                     |  |  |  |  |  |  |  |  |  |  |  |
| 1. [Signature]                                                                                                                                                                                                                                                                                                                                                                                                |             | 2. [Signature]                         |       | 3. [Signature]                      |           | 4. [Signature]          |    | PROJECT NAME: Willow Branch Apartments  |  |  |  |  |  |  |  |  |  |  |  |
| 2. [Signature]                                                                                                                                                                                                                                                                                                                                                                                                |             | 3. [Signature]                         |       | 4. [Signature]                      |           | 5. [Signature]          |    | PROJECT #: HW247281A                    |  |  |  |  |  |  |  |  |  |  |  |
| 3. [Signature]                                                                                                                                                                                                                                                                                                                                                                                                |             | 4. [Signature]                         |       | 5. [Signature]                      |           | 6. [Signature]          |    | SITE ADDRESS: 822 North Indian Creek Dr |  |  |  |  |  |  |  |  |  |  |  |
| SPECIAL INSTRUCTIONS/COMMENTS:                                                                                                                                                                                                                                                                                                                                                                                |             | SHIPMENT METHOD                        |       | OUT: / / VIA:                       |           | IN: / / VIA:            |    | SEND REPORT TO:                         |  |  |  |  |  |  |  |  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                               |             |                                        |       | Client FedEx UPS US mail courier    |           | other: _____            |    | INVOICE TO (IF DIFFERENT FROM ABOVE):   |  |  |  |  |  |  |  |  |  |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                               |             |                                        |       |                                     |           |                         |    | QUOTE #: _____ PO#: _____               |  |  |  |  |  |  |  |  |  |  |  |
| Submission of samples to the laboratory constitutes acceptance of EETSE's Terms & Conditions. Client assumes sole responsibility for damage or loss of samples before we accept them. Samples received after 3PM or on business day. If no TAT is marked on COC, EETSE-Atlanta will proceed with standard TAT. Samples are disposed of 30 days after completion of report unless other arrangements are made. |             |                                        |       |                                     |           |                         |    |                                         |  |  |  |  |  |  |  |  |  |  |  |

Matrix Codes: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water ST = Stormwater WW = Waste Water W = Water (Blanks) DW = Drinking Water (Blanks) O = Other (specify)  
Preservative Codes: H+I = Hydrochloric acid + ice I = Ice only N = Nitric acid S+I = Sulfuric acid + ice S/M+I = Sodium Bisulfate/Methanol + ice NaOH=SH O = Other (specify) NA = None

## CHAIN OF CUSTODY

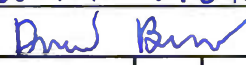
[illegible]

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Preservative Codes: H+I = Hydrochloric acid + ice I = Ice only N = Nitric acid S+I = Sulfuric acid + ice S/M+I = Sodium Bisulfate/Methanol + ice NaOH=SH O = Other (specify) NA = None

Environment Testing

CHAIN OF CUSTODY

| COMPANY: Terracon                         |             | ADDRESS: 514 Hillcrest Industrial Blvd                                                       |       | ANALYSIS REQUESTED |           |                       |    |                          |  |  |  |  |  |  |  |  |  |  |  |
|-------------------------------------------|-------------|----------------------------------------------------------------------------------------------|-------|--------------------|-----------|-----------------------|----|--------------------------|--|--|--|--|--|--|--|--|--|--|--|
| PHONE: 478-757-1606                       |             | EMAIL: Todd.Peterson@terracon.com                                                            |       |                    |           |                       |    |                          |  |  |  |  |  |  |  |  |  |  |  |
| SAMPLED BY: Anthony Whipple & David Baird |             | SIGNATURE:  |       |                    |           |                       |    |                          |  |  |  |  |  |  |  |  |  |  |  |
| #                                         | SAMPLE ID   | SAMPLED:                                                                                     |       | GRAB               | COMPOSITE | MATRIX<br>(see codes) | Pb | PRESERVATION (see codes) |  |  |  |  |  |  |  |  |  |  |  |
|                                           |             | DATE                                                                                         | TIME  |                    |           |                       |    |                          |  |  |  |  |  |  |  |  |  |  |  |
| ✓                                         | WBAK / A-1S | 10/7                                                                                         | 13:54 |                    | ✓         |                       | ✓  |                          |  |  |  |  |  |  |  |  |  |  |  |
| ✓                                         | WBAK / A-2S | 10/7                                                                                         | 13:57 |                    | ✓         |                       | ✓  |                          |  |  |  |  |  |  |  |  |  |  |  |
| ✓                                         | WBAH / B-1S | 10/7                                                                                         | 14:08 |                    | ✓         |                       | ✓  |                          |  |  |  |  |  |  |  |  |  |  |  |
| ✓                                         | WBAH / C-1S | 10/7                                                                                         | 14:12 |                    | ✓         |                       | ✓  |                          |  |  |  |  |  |  |  |  |  |  |  |
| ✓                                         | WBAH / D-1S | 10/7                                                                                         | 14:15 |                    | ✓         |                       | ✓  |                          |  |  |  |  |  |  |  |  |  |  |  |
| ✓                                         | WBAH / A-1S | 10/7                                                                                         | 14:19 |                    | ✓         |                       | ✓  |                          |  |  |  |  |  |  |  |  |  |  |  |
| ✓                                         | WBAH / A-2S | 10/7                                                                                         | 14:22 |                    | ✓         |                       | ✓  |                          |  |  |  |  |  |  |  |  |  |  |  |
| ✓                                         | WBAJ / A-1S | 10/7                                                                                         | 14:52 |                    | ✓         |                       | ✓  |                          |  |  |  |  |  |  |  |  |  |  |  |
| ✓                                         | WBAJ / B-1S | 10/7                                                                                         | 14:56 |                    | ✓         |                       | ✓  |                          |  |  |  |  |  |  |  |  |  |  |  |
| ✓                                         | WBAJ / C-1S | 10/7                                                                                         | 15:00 |                    | ✓         |                       | ✓  |                          |  |  |  |  |  |  |  |  |  |  |  |
| ✓                                         | WBAJ / D-1S | 10/7                                                                                         | 15:04 |                    | ✓         |                       | ✓  |                          |  |  |  |  |  |  |  |  |  |  |  |
| 12                                        |             |                                                                                              |       |                    |           |                       |    |                          |  |  |  |  |  |  |  |  |  |  |  |
| 13                                        |             |                                                                                              |       |                    |           |                       |    |                          |  |  |  |  |  |  |  |  |  |  |  |
| 14                                        |             |                                                                                              |       |                    |           |                       |    |                          |  |  |  |  |  |  |  |  |  |  |  |

|                                                                                        |  |            |  |                                                                                                                                                                                   |  |            |  |                                            |  |  |  |  |  |  |  |  |  |
|----------------------------------------------------------------------------------------|--|------------|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|------------|--|--------------------------------------------|--|--|--|--|--|--|--|--|--|
| RELINQUISHED BY:                                                                       |  | DATE/TIME: |  | RECEIVED BY:                                                                                                                                                                      |  | DATE/TIME: |  | PROJECT INFORMATION                        |  |  |  |  |  |  |  |  |  |
| 1. David Baird                                                                         |  | 10/9 12:00 |  | 1.                                                                                             |  | 10/9 10:12 |  | PROJECT NAME: Willow Branch Apartment      |  |  |  |  |  |  |  |  |  |
| 2.  |  | 10/9 12:10 |  | 2.                                                                                             |  | 10/9 12:10 |  | PROJECT #: H0247281A                       |  |  |  |  |  |  |  |  |  |
| 3.                                                                                     |  |            |  | 3.                                                                                                                                                                                |  |            |  | SITE ADDRESS: 822 North Indian Creek drive |  |  |  |  |  |  |  |  |  |
| SPECIAL INSTRUCTIONS/COMMENTS:                                                         |  |            |  | SHIPMENT METHOD<br>OUT: / / VIA:<br>IN: / / VIA:<br>Client FedEx UPS US mail <br>other: _____ |  |            |  | SEND REPORT TO:                            |  |  |  |  |  |  |  |  |  |
|                                                                                        |  |            |  |                                                                                                                                                                                   |  |            |  | INVOICE TO (IF DIFFERENT FROM ABOVE):      |  |  |  |  |  |  |  |  |  |
|                                                                                        |  |            |  |                                                                                                                                                                                   |  |            |  | QUOTE #: _____ PO#: _____                  |  |  |  |  |  |  |  |  |  |

Submission of samples to the laboratory constitutes acceptance of EETSE's Terms & Conditions. Client assumes sole responsibility for damage or loss of samples before we accept them. Samples received after 3PM or business day. If no TAT is marked on COC, EETSE-Atlanta will proceed with standard TAT. Samples are disposed of 30 days after completion of report unless other arrangements

Matrix Codes: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water ST=Stormwater WW = Waste Water W = Water (Blanks) DW = Drinking Water (Blanks) O = Other (specify)

Preservative Codes: H+I = Hydrochloric acid + ice I = Ice only N = Nitric acid S+I = Sulfuric acid + ice S/M+I = Sodium Bisulfate/Methanol + ice NaOH=SH O = Other (specify) NA = None

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAG/A-1S

Lab Sample ID: 705-9758-1

Date Collected: 10/07/24 10:04

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 77.2

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 54     |           | 4.9 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 11:47 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
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Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAG/A-2S

Lab Sample ID: 705-9758-2

Date Collected: 10/07/24 10:08

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 84.2

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 30     |           | 4.2 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 11:32 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAG/B-1S  
Date Collected: 10/07/24 10:11  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-3  
Matrix: Solid  
Percent Solids: 85.7

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 23     |           | 4.2 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 11:50 | 1       |

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- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9



Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAG/D-1S  
Date Collected: 10/07/24 10:15  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-4  
Matrix: Solid  
Percent Solids: 79.1

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 23     |           | 4.6 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 11:53 | 1       |

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- 4
- 5
- 6
- 7
- 8
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Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAP/A-1S  
Date Collected: 10/07/24 10:22  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-5  
Matrix: Solid  
Percent Solids: 76.6

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 20     |           | 4.8 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 11:56 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
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Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAP/A-2S  
Date Collected: 10/07/24 10:26  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-6  
Matrix: Solid  
Percent Solids: 86.6

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 19     |           | 4.0 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 12:06 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAP/A-3S  
Date Collected: 10/07/24 10:28  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-7  
Matrix: Solid  
Percent Solids: 83.0

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 27     |           | 4.2 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 12:09 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAP/D-1S  
Date Collected: 10/07/24 10:33  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-8  
Matrix: Solid  
Percent Solids: 87.4

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 18     |           | 4.1 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 12:12 | 1       |

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- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAP/C-3S  
Date Collected: 10/07/24 10:45  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-9  
Matrix: Solid  
Percent Solids: 88.2

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 37     |           | 4.3 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 12:15 | 1       |

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- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9



Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAP/C-2S  
Date Collected: 10/07/24 10:48  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-10  
Matrix: Solid  
Percent Solids: 91.4

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 15     |           | 3.9 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 12:18 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAP/C-1S  
Date Collected: 10/07/24 10:53  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-11  
Matrix: Solid  
Percent Solids: 77.2

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 29     |           | 4.7 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 12:21 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAP/B-1S  
Date Collected: 10/07/24 10:57  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-12  
Matrix: Solid  
Percent Solids: 78.6

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 42     |           | 4.9 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 12:24 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAN/B-1S  
Date Collected: 10/07/24 11:06  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-13  
Matrix: Solid  
Percent Solids: 86.5

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 42     |           | 4.3 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 12:27 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAN/A-1S

Lab Sample ID: 705-9758-14

Date Collected: 10/07/24 11:10

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 81.8

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 17     |           | 4.0 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 12:30 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAN/A-2S  
Date Collected: 10/07/24 11:14  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-15  
Matrix: Solid  
Percent Solids: 77.2

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 17     |           | 4.6 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 12:33 | 1       |

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- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9



Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAN/D-1S  
Date Collected: 10/07/24 11:17  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-16  
Matrix: Solid  
Percent Solids: 86.8

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 23     |           | 4.3 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 12:43 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
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Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAM/B-1S

Lab Sample ID: 705-9758-17

Date Collected: 10/07/24 11:24

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 82.4

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 22     |           | 4.3 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 12:46 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
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Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAM/C-1S

Lab Sample ID: 705-9758-18

Date Collected: 10/07/24 11:27

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 81.8

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 18     |           | 4.6 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 12:49 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAM/D-1S  
Date Collected: 10/07/24 11:30  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-19  
Matrix: Solid  
Percent Solids: 84.1

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 20     |           | 4.0 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 12:52 | 1       |

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAM/A-1S  
Date Collected: 10/07/24 11:33  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-20  
Matrix: Solid  
Percent Solids: 81.8

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 180    |           | 4.3 | mg/Kg | ☼ | 10/14/24 14:10 | 10/15/24 12:55 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
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Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAL/B-1S  
Date Collected: 10/07/24 13:25  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-21  
Matrix: Solid  
Percent Solids: 85.5

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 18     |           | 3.6 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 13:03 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
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Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAL/A-2S

Lab Sample ID: 705-9758-22

Date Collected: 10/07/24 13:28

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 83.1

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 24     |           | 4.0 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 13:17 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
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Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAL/A-1S

Lab Sample ID: 705-9758-23

Date Collected: 10/07/24 13:32

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 79.8

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 22     |           | 4.3 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 13:20 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAL/D-1S  
Date Collected: 10/07/24 13:35  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-24  
Matrix: Solid  
Percent Solids: 79.5

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 18     |           | 4.4 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 14:23 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAK/B-1S  
Date Collected: 10/07/24 13:40  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-25  
Matrix: Solid  
Percent Solids: 86.0

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 28     |           | 3.6 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 13:32 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAK/C-1S  
Date Collected: 10/07/24 13:44  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-26  
Matrix: Solid  
Percent Solids: 81.9

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 23     |           | 3.6 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 14:26 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAK/C-2S  
Date Collected: 10/07/24 13:47  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-27  
Matrix: Solid  
Percent Solids: 79.5

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 29     |           | 3.8 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 13:38 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9



Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAK/D-1S  
Date Collected: 10/07/24 13:50  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-28  
Matrix: Solid  
Percent Solids: 86.6

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 24     |           | 3.5 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 13:40 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAK/A-1S  
Date Collected: 10/07/24 13:54  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-29  
Matrix: Solid  
Percent Solids: 84.3

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 22     |           | 3.5 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 13:43 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAK/A-2S  
Date Collected: 10/07/24 13:57  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-30  
Matrix: Solid  
Percent Solids: 85.6

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 21     |           | 3.5 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 13:46 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAH/B-1S  
Date Collected: 10/07/24 14:08  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-31  
Matrix: Solid  
Percent Solids: 83.3

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 16     |           | 4.4 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 13:49 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAH/C-1S

Lab Sample ID: 705-9758-32

Date Collected: 10/07/24 14:12

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 77.4

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 19     |           | 3.8 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 13:52 | 1       |

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAH/D-1S  
Date Collected: 10/07/24 14:15  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-33  
Matrix: Solid  
Percent Solids: 76.0

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 36     |           | 5.0 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 13:55 | 1       |

- 1
- 2
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- 5
- 6
- 7
- 8
- 9



Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAH/A-1S

Lab Sample ID: 705-9758-34

Date Collected: 10/07/24 14:19

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 79.1

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 36     |           | 3.8 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 14:05 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAH/A-2S  
Date Collected: 10/07/24 14:22  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-35  
Matrix: Solid  
Percent Solids: 82.6

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 33     |           | 3.8 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 14:09 | 1       |

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAJ/A-1S  
Date Collected: 10/07/24 14:52  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-36  
Matrix: Solid  
Percent Solids: 92.2

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 10     |           | 3.6 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 14:12 | 1       |

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- 4
- 5
- 6
- 7
- 8
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Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAJ/B-1S

Lab Sample ID: 705-9758-37

Date Collected: 10/07/24 14:56

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 80.2

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 17     |           | 4.3 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 14:15 | 1       |

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- 2
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- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAJ/C-1S

Lab Sample ID: 705-9758-38

Date Collected: 10/07/24 15:00

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 77.4

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 35     |           | 5.2 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 14:18 | 1       |

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9

Client Sample Results

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAJ/D-1S  
Date Collected: 10/07/24 15:04  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-39  
Matrix: Solid  
Percent Solids: 86.8

Method: SW846 6010D - Metals (ICP)

| Analyte | Result | Qualifier | RL  | Unit  | D | Prepared       | Analyzed       | Dil Fac |
|---------|--------|-----------|-----|-------|---|----------------|----------------|---------|
| Lead    | 26     |           | 4.3 | mg/Kg | ☼ | 10/15/24 07:10 | 10/15/24 14:21 | 1       |

- 1
- 2
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- 4
- 5
- 6
- 7
- 8
- 9

# Lab Chronicle

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

**Client Sample ID: WBAG/A-1S**

Date Collected: 10/07/24 10:04

Date Received: 10/09/24 12:10

**Lab Sample ID: 705-9758-1**

Matrix: Solid

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16591        | ASA     | EET ATL | 10/14/24 08:33       |

**Client Sample ID: WBAG/A-1S**

Date Collected: 10/07/24 10:04

Date Received: 10/09/24 12:10

**Lab Sample ID: 705-9758-1**

Matrix: Solid

Percent Solids: 77.2

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 11:47       |

**Client Sample ID: WBAG/A-2S**

Date Collected: 10/07/24 10:08

Date Received: 10/09/24 12:10

**Lab Sample ID: 705-9758-2**

Matrix: Solid

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16845        | AW      | EET ATL | 10/15/24 10:32       |

**Client Sample ID: WBAG/A-2S**

Date Collected: 10/07/24 10:08

Date Received: 10/09/24 12:10

**Lab Sample ID: 705-9758-2**

Matrix: Solid

Percent Solids: 84.2

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 11:32       |

**Client Sample ID: WBAG/B-1S**

Date Collected: 10/07/24 10:11

Date Received: 10/09/24 12:10

**Lab Sample ID: 705-9758-3**

Matrix: Solid

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16845        | AW      | EET ATL | 10/15/24 10:32       |

**Client Sample ID: WBAG/B-1S**

Date Collected: 10/07/24 10:11

Date Received: 10/09/24 12:10

**Lab Sample ID: 705-9758-3**

Matrix: Solid

Percent Solids: 85.7

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 11:50       |

**Client Sample ID: WBAG/D-1S**

Date Collected: 10/07/24 10:15

Date Received: 10/09/24 12:10

**Lab Sample ID: 705-9758-4**

Matrix: Solid

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16845        | AW      | EET ATL | 10/15/24 10:32       |

Eurofins Atlanta



# Lab Chronicle

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

**Client Sample ID: WBAG/D-1S**

**Date Collected: 10/07/24 10:15**

**Date Received: 10/09/24 12:10**

**Lab Sample ID: 705-9758-4**

**Matrix: Solid**

**Percent Solids: 79.1**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 11:53       |

**Client Sample ID: WBAP/A-1S**

**Date Collected: 10/07/24 10:22**

**Date Received: 10/09/24 12:10**

**Lab Sample ID: 705-9758-5**

**Matrix: Solid**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16845        | AW      | EET ATL | 10/15/24 10:32       |

**Client Sample ID: WBAP/A-1S**

**Date Collected: 10/07/24 10:22**

**Date Received: 10/09/24 12:10**

**Lab Sample ID: 705-9758-5**

**Matrix: Solid**

**Percent Solids: 76.6**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 11:56       |

**Client Sample ID: WBAP/A-2S**

**Date Collected: 10/07/24 10:26**

**Date Received: 10/09/24 12:10**

**Lab Sample ID: 705-9758-6**

**Matrix: Solid**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16845        | AW      | EET ATL | 10/15/24 10:32       |

**Client Sample ID: WBAP/A-2S**

**Date Collected: 10/07/24 10:26**

**Date Received: 10/09/24 12:10**

**Lab Sample ID: 705-9758-6**

**Matrix: Solid**

**Percent Solids: 86.6**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 12:06       |

**Client Sample ID: WBAP/A-3S**

**Date Collected: 10/07/24 10:28**

**Date Received: 10/09/24 12:10**

**Lab Sample ID: 705-9758-7**

**Matrix: Solid**

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16845        | AW      | EET ATL | 10/15/24 10:32       |

# Lab Chronicle

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

## Client Sample ID: WBAP/A-3S

Date Collected: 10/07/24 10:28

Date Received: 10/09/24 12:10

## Lab Sample ID: 705-9758-7

Matrix: Solid

Percent Solids: 83.0

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 12:09       |

## Client Sample ID: WBAP/D-1S

Date Collected: 10/07/24 10:33

Date Received: 10/09/24 12:10

## Lab Sample ID: 705-9758-8

Matrix: Solid

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16845        | AW      | EET ATL | 10/15/24 10:32       |

## Client Sample ID: WBAP/D-1S

Date Collected: 10/07/24 10:33

Date Received: 10/09/24 12:10

## Lab Sample ID: 705-9758-8

Matrix: Solid

Percent Solids: 87.4

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 12:12       |

## Client Sample ID: WBAP/C-3S

Date Collected: 10/07/24 10:45

Date Received: 10/09/24 12:10

## Lab Sample ID: 705-9758-9

Matrix: Solid

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16845        | AW      | EET ATL | 10/15/24 10:32       |

## Client Sample ID: WBAP/C-3S

Date Collected: 10/07/24 10:45

Date Received: 10/09/24 12:10

## Lab Sample ID: 705-9758-9

Matrix: Solid

Percent Solids: 88.2

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 12:15       |

## Client Sample ID: WBAP/C-2S

Date Collected: 10/07/24 10:48

Date Received: 10/09/24 12:10

## Lab Sample ID: 705-9758-10

Matrix: Solid

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16845        | AW      | EET ATL | 10/15/24 10:32       |

# Lab Chronicle

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

**Client Sample ID: WBAP/C-2S**

**Lab Sample ID: 705-9758-10**

Date Collected: 10/07/24 10:48

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 91.4

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 12:18       |

**Client Sample ID: WBAP/C-1S**

**Lab Sample ID: 705-9758-11**

Date Collected: 10/07/24 10:53

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16845        | AW      | EET ATL | 10/15/24 10:32       |

**Client Sample ID: WBAP/C-1S**

**Lab Sample ID: 705-9758-11**

Date Collected: 10/07/24 10:53

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 77.2

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 12:21       |

**Client Sample ID: WBAP/B-1S**

**Lab Sample ID: 705-9758-12**

Date Collected: 10/07/24 10:57

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16845        | AW      | EET ATL | 10/15/24 10:32       |

**Client Sample ID: WBAP/B-1S**

**Lab Sample ID: 705-9758-12**

Date Collected: 10/07/24 10:57

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 78.6

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 12:24       |

**Client Sample ID: WBAN/B-1S**

**Lab Sample ID: 705-9758-13**

Date Collected: 10/07/24 11:06

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16845        | AW      | EET ATL | 10/15/24 10:32       |

# Lab Chronicle

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

**Client Sample ID: WBAN/B-1S**

**Lab Sample ID: 705-9758-13**

Date Collected: 10/07/24 11:06

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 86.5

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 12:27       |

**Client Sample ID: WBAN/A-1S**

**Lab Sample ID: 705-9758-14**

Date Collected: 10/07/24 11:10

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16845        | AW      | EET ATL | 10/15/24 10:32       |

**Client Sample ID: WBAN/A-1S**

**Lab Sample ID: 705-9758-14**

Date Collected: 10/07/24 11:10

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 81.8

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 12:30       |

**Client Sample ID: WBAN/A-2S**

**Lab Sample ID: 705-9758-15**

Date Collected: 10/07/24 11:14

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16845        | AW      | EET ATL | 10/15/24 10:32       |

**Client Sample ID: WBAN/A-2S**

**Lab Sample ID: 705-9758-15**

Date Collected: 10/07/24 11:14

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 77.2

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 12:33       |

**Client Sample ID: WBAN/D-1S**

**Lab Sample ID: 705-9758-16**

Date Collected: 10/07/24 11:17

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16873        | AW      | EET ATL | 10/15/24 11:25       |

# Lab Chronicle

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

**Client Sample ID: WBAN/D-1S**

**Lab Sample ID: 705-9758-16**

Date Collected: 10/07/24 11:17

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 86.8

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 12:43       |

**Client Sample ID: WBAM/B-1S**

**Lab Sample ID: 705-9758-17**

Date Collected: 10/07/24 11:24

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16873        | AW      | EET ATL | 10/15/24 11:25       |

**Client Sample ID: WBAM/B-1S**

**Lab Sample ID: 705-9758-17**

Date Collected: 10/07/24 11:24

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 82.4

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 12:46       |

**Client Sample ID: WBAM/C-1S**

**Lab Sample ID: 705-9758-18**

Date Collected: 10/07/24 11:27

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16873        | AW      | EET ATL | 10/15/24 11:25       |

**Client Sample ID: WBAM/C-1S**

**Lab Sample ID: 705-9758-18**

Date Collected: 10/07/24 11:27

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 81.8

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 12:49       |

**Client Sample ID: WBAM/D-1S**

**Lab Sample ID: 705-9758-19**

Date Collected: 10/07/24 11:30

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16873        | AW      | EET ATL | 10/15/24 11:25       |

# Lab Chronicle

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAM/D-1S

Lab Sample ID: 705-9758-19

Date Collected: 10/07/24 11:30

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 84.1

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 12:52       |

Client Sample ID: WBAM/A-1S

Lab Sample ID: 705-9758-20

Date Collected: 10/07/24 11:33

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16873        | AW      | EET ATL | 10/15/24 11:25       |

Client Sample ID: WBAM/A-1S

Lab Sample ID: 705-9758-20

Date Collected: 10/07/24 11:33

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 81.8

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16687        | BL      | EET ATL | 10/14/24 14:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16923        | DS      | EET ATL | 10/15/24 12:55       |

Client Sample ID: WBAL/B-1S

Lab Sample ID: 705-9758-21

Date Collected: 10/07/24 13:25

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16873        | AW      | EET ATL | 10/15/24 11:25       |

Client Sample ID: WBAL/B-1S

Lab Sample ID: 705-9758-21

Date Collected: 10/07/24 13:25

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 85.5

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 13:03       |

Client Sample ID: WBAL/A-2S

Lab Sample ID: 705-9758-22

Date Collected: 10/07/24 13:28

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16873        | AW      | EET ATL | 10/15/24 11:25       |

Lab Chronicle

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAL/A-2S  
Date Collected: 10/07/24 13:28  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-22  
Matrix: Solid  
Percent Solids: 83.1

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 13:17       |

Client Sample ID: WBAL/A-1S  
Date Collected: 10/07/24 13:32  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-23  
Matrix: Solid

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16873        | AW      | EET ATL | 10/15/24 11:25       |

Client Sample ID: WBAL/A-1S  
Date Collected: 10/07/24 13:32  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-23  
Matrix: Solid  
Percent Solids: 79.8

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 13:20       |

Client Sample ID: WBAL/D-1S  
Date Collected: 10/07/24 13:35  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-24  
Matrix: Solid

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16873        | AW      | EET ATL | 10/15/24 11:25       |

Client Sample ID: WBAL/D-1S  
Date Collected: 10/07/24 13:35  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-24  
Matrix: Solid  
Percent Solids: 79.5

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 14:23       |

Client Sample ID: WBAK/B-1S  
Date Collected: 10/07/24 13:40  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-25  
Matrix: Solid

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16873        | AW      | EET ATL | 10/15/24 11:25       |



# Lab Chronicle

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

**Client Sample ID: WBAK/B-1S**

**Lab Sample ID: 705-9758-25**

Date Collected: 10/07/24 13:40

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 86.0

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 13:32       |

**Client Sample ID: WBAK/C-1S**

**Lab Sample ID: 705-9758-26**

Date Collected: 10/07/24 13:44

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16873        | AW      | EET ATL | 10/15/24 11:25       |

**Client Sample ID: WBAK/C-1S**

**Lab Sample ID: 705-9758-26**

Date Collected: 10/07/24 13:44

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 81.9

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 14:26       |

**Client Sample ID: WBAK/C-2S**

**Lab Sample ID: 705-9758-27**

Date Collected: 10/07/24 13:47

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16873        | AW      | EET ATL | 10/15/24 11:25       |

**Client Sample ID: WBAK/C-2S**

**Lab Sample ID: 705-9758-27**

Date Collected: 10/07/24 13:47

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 79.5

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 13:38       |

**Client Sample ID: WBAK/D-1S**

**Lab Sample ID: 705-9758-28**

Date Collected: 10/07/24 13:50

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16873        | AW      | EET ATL | 10/15/24 11:25       |

# Lab Chronicle

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

**Client Sample ID: WBAK/D-1S**

**Lab Sample ID: 705-9758-28**

Date Collected: 10/07/24 13:50

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 86.6

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 13:40       |

**Client Sample ID: WBAK/A-1S**

**Lab Sample ID: 705-9758-29**

Date Collected: 10/07/24 13:54

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16873        | AW      | EET ATL | 10/15/24 11:25       |

**Client Sample ID: WBAK/A-1S**

**Lab Sample ID: 705-9758-29**

Date Collected: 10/07/24 13:54

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 84.3

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 13:43       |

**Client Sample ID: WBAK/A-2S**

**Lab Sample ID: 705-9758-30**

Date Collected: 10/07/24 13:57

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16873        | AW      | EET ATL | 10/15/24 11:25       |

**Client Sample ID: WBAK/A-2S**

**Lab Sample ID: 705-9758-30**

Date Collected: 10/07/24 13:57

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 85.6

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 13:46       |

**Client Sample ID: WBAH/B-1S**

**Lab Sample ID: 705-9758-31**

Date Collected: 10/07/24 14:08

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16900        | AW      | EET ATL | 10/15/24 13:10       |

Lab Chronicle

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAH/B-1S  
Date Collected: 10/07/24 14:08  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-31  
Matrix: Solid  
Percent Solids: 83.3

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 13:49       |

Client Sample ID: WBAH/C-1S  
Date Collected: 10/07/24 14:12  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-32  
Matrix: Solid

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16900        | AW      | EET ATL | 10/15/24 13:10       |

Client Sample ID: WBAH/C-1S  
Date Collected: 10/07/24 14:12  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-32  
Matrix: Solid  
Percent Solids: 77.4

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 13:52       |

Client Sample ID: WBAH/D-1S  
Date Collected: 10/07/24 14:15  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-33  
Matrix: Solid

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16900        | AW      | EET ATL | 10/15/24 13:10       |

Client Sample ID: WBAH/D-1S  
Date Collected: 10/07/24 14:15  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-33  
Matrix: Solid  
Percent Solids: 76.0

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 13:55       |

Client Sample ID: WBAH/A-1S  
Date Collected: 10/07/24 14:19  
Date Received: 10/09/24 12:10

Lab Sample ID: 705-9758-34  
Matrix: Solid

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16900        | AW      | EET ATL | 10/15/24 13:10       |

# Lab Chronicle

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAH/A-1S

Lab Sample ID: 705-9758-34

Date Collected: 10/07/24 14:19

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 79.1

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 14:05       |

Client Sample ID: WBAH/A-2S

Lab Sample ID: 705-9758-35

Date Collected: 10/07/24 14:22

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16900        | AW      | EET ATL | 10/15/24 13:10       |

Client Sample ID: WBAH/A-2S

Lab Sample ID: 705-9758-35

Date Collected: 10/07/24 14:22

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 82.6

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 14:09       |

Client Sample ID: WBAJ/A-1S

Lab Sample ID: 705-9758-36

Date Collected: 10/07/24 14:52

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16900        | AW      | EET ATL | 10/15/24 13:10       |

Client Sample ID: WBAJ/A-1S

Lab Sample ID: 705-9758-36

Date Collected: 10/07/24 14:52

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 92.2

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 14:12       |

Client Sample ID: WBAJ/B-1S

Lab Sample ID: 705-9758-37

Date Collected: 10/07/24 14:56

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16900        | AW      | EET ATL | 10/15/24 13:10       |

# Lab Chronicle

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Client Sample ID: WBAJ/B-1S

Lab Sample ID: 705-9758-37

Date Collected: 10/07/24 14:56

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 80.2

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 14:15       |

Client Sample ID: WBAJ/C-1S

Lab Sample ID: 705-9758-38

Date Collected: 10/07/24 15:00

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16900        | AW      | EET ATL | 10/15/24 13:10       |

Client Sample ID: WBAJ/C-1S

Lab Sample ID: 705-9758-38

Date Collected: 10/07/24 15:00

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 77.4

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 14:18       |

Client Sample ID: WBAJ/D-1S

Lab Sample ID: 705-9758-39

Date Collected: 10/07/24 15:04

Matrix: Solid

Date Received: 10/09/24 12:10

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Analysis   | D 2216       |     | 1               | 16900        | AW      | EET ATL | 10/15/24 13:10       |

Client Sample ID: WBAJ/D-1S

Lab Sample ID: 705-9758-39

Date Collected: 10/07/24 15:04

Matrix: Solid

Date Received: 10/09/24 12:10

Percent Solids: 86.8

| Prep Type | Batch Type | Batch Method | Run | Dilution Factor | Batch Number | Analyst | Lab     | Prepared or Analyzed |
|-----------|------------|--------------|-----|-----------------|--------------|---------|---------|----------------------|
| Total/NA  | Prep       | 3050B        |     |                 | 16691        | BR      | EET ATL | 10/15/24 07:10       |
| Total/NA  | Analysis   | 6010D        |     | 1               | 16915        | DAB     | EET ATL | 10/15/24 14:21       |

## Laboratory References:

EET ATL = Eurofins Atlanta, 3080 Presidential Dr, Atlanta, GA 30340, TEL (770)457-8177

Accreditation/Certification Summary

Client: Terracon Consultants Inc  
Project/Site: Willow Branch Apartments

Job ID: 705-9758-1

Laboratory: Eurofins Atlanta

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

| Authority                                                                                                                                                                                              | Program     | Identification Number | Expiration Date  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------|------------------|
| Florida                                                                                                                                                                                                | NELAP       | E87582                | 06-30-25         |
| The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification . |             |                       |                  |
| Analysis Method                                                                                                                                                                                        | Prep Method | Matrix                | Analyte          |
| D 2216                                                                                                                                                                                                 |             | Solid                 | Percent Moisture |

## Login Sample Receipt Checklist

Client: Terracon Consultants Inc

Job Number: 705-9758-1

Login Number: 9758

List Source: Eurofins Atlanta

List Number: 1

Creator: Pomuti, Carmen

| Question                                                                                 | Answer | Comment     |
|------------------------------------------------------------------------------------------|--------|-------------|
| Radioactivity wasn't checked or is $\leq$ background as measured by a survey meter.      | N/A    |             |
| The cooler's custody seal, if present, is intact.                                        | True   | Not present |
| Sample custody seals, if present, are intact.                                            | True   |             |
| The cooler or samples do not appear to have been compromised or tampered with.           | True   |             |
| Samples were received on ice.                                                            | N/A    |             |
| Cooler Temperature is acceptable.                                                        | N/A    |             |
| Cooler Temperature is recorded.                                                          | N/A    |             |
| COC is present.                                                                          | True   |             |
| COC is filled out in ink and legible.                                                    | True   |             |
| COC is filled out with all pertinent information.                                        | True   |             |
| Is the Field Sampler's name present on COC?                                              | True   |             |
| There are no discrepancies between the containers received and the COC.                  | True   |             |
| Samples are received within Holding Time (excluding tests with immediate HTs)            | True   |             |
| Sample containers have legible labels.                                                   | True   |             |
| Containers are not broken or leaking.                                                    | True   |             |
| Sample collection date/times are provided.                                               | True   |             |
| Appropriate sample containers are used.                                                  | True   |             |
| Sample bottles are completely filled.                                                    | True   |             |
| Sample Preservation Verified.                                                            | N/A    |             |
| There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs         | True   |             |
| Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4"). | True   |             |
| Multiphasic samples are not present.                                                     | True   |             |
| Samples do not require splitting or compositing.                                         | True   |             |
| Residual Chlorine Checked.                                                               | N/A    |             |



END OF REPORT

## **Hazardous Materials Inspection Report**

Willow Branch Apartments | Clarkston, Georgia

November 12, 2024 | Terracon Project Number HN247281A



## **APPENDIX D**

### **PHOTOGRAPHIC DOCUMENTATION**

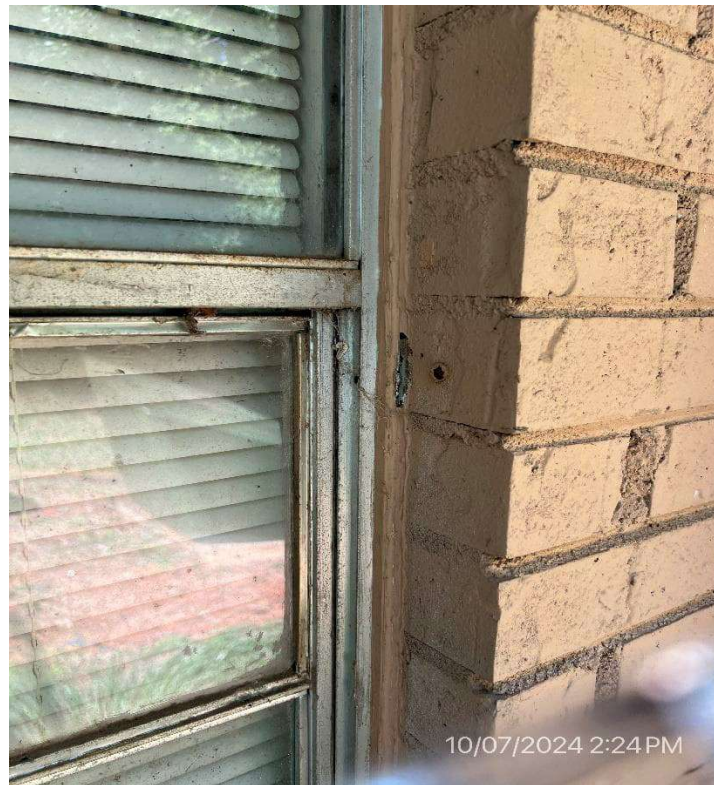
## Hazardous Materials Inspection Report

Willow Branch Apartments | Clarkston, Georgia

November 12, 2024 | Terracon Project Number HN247281A



General Photo of the exterior of one of the onsite buildings



General Photo of the exterior window caulk

## Hazardous Materials Inspection Report

Willow Branch Apartments | Clarkston, Georgia

November 12, 2024 | Terracon Project Number HN247281A



General photo of the textured ceilings



General photo of the exterior hallways to the apartments

## **Hazardous Materials Inspection Report**

Willow Branch Apartments | Clarkston, Georgia

November 12, 2024 | Terracon Project Number HN247281A



## **APPENDIX E**

### **INSPECTOR CREDENTIALS**



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# ***The Environmental Institute***

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## ***Patrick Daniel***

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Social Security Number - XXX-XX-1635

Terracon Consultants - 514 Hillcrest Industrial Boulevard, Macon, GA 31204

*Has completed 4 hours of coursework and satisfactorily  
passed an examination that meets all criteria required for  
EPA/AHERA/ASHARA (TSCA Title II) Approved Reaccreditation*

### ***Asbestos in Buildings: Inspector Refresher***

***November 14, 2023***

Course Date

***19660***

Certificate Number

***November 14, 2023***

Examination Date

***November 14, 2024***

Expiration Date

  
Beverly B. Campbell - Course Director/Training Manager



(Approved by the ABIH Certification Maintenance Committee for 1/2 CM point - Approval #11-577)

Florida Accreditation #0002805; Tennessee Accreditation #A-TP-IR-148-139089; Alabama Accreditation # SS-2210-ASBTTPR-01

TEI - 1395 S. Marietta Parkway SE - Building 100, Suite 124 - Marietta, GA 30067

Phone: 770-427-3600 - Website: [www.tei-atl.com](http://www.tei-atl.com)

# ***The Environmental Institute***

## ***Anthony Whipple***

Social Security Number - XXX-XX-3420

Terracon Consultants - 514 Hillcrest Industrial Boulevard, Macon, GA 31204

*Has completed 8 hours of coursework and satisfactorily passed the hands-on skills assessment and an examination that meets training criteria in accordance with requirements for Lead-Based Paint Activities in Target Housing and Child-Occupied Facilities as regulated by Georgia DNR/EPD Chapter 391-3-24 and U. S. EPA TSCA 40 CFR Part 745 for the refresher course titled*

## ***Lead Inspector Refresher***

***December 13 2023***

Course Date

***December 13, 2023***

Examination Date

***December 13, 2025***

Georgia Expiration Date

***December 13, 2026***

EPA Expiration Date

***2114***

Certificate Number



Bonnie B. Maurras- Principal Instructor/Training Manager

(Approved by the ABIH Certification Maintenance Committee for 1 CM point - Approval #11-584)  
(State of Georgia Accredited - Certification No. 20-0799-006SR - September 21, 1999)

Alabama Accreditation #20-021022-33826

TEI - 1395 S. Marietta Parkway SE - Building 100, Suite 124 - Marietta, GA 30067  
Phone: 770-427-3600 - Website: [www.tei-atl.com](http://www.tei-atl.com)



## **Hazardous Materials Inspection Report**

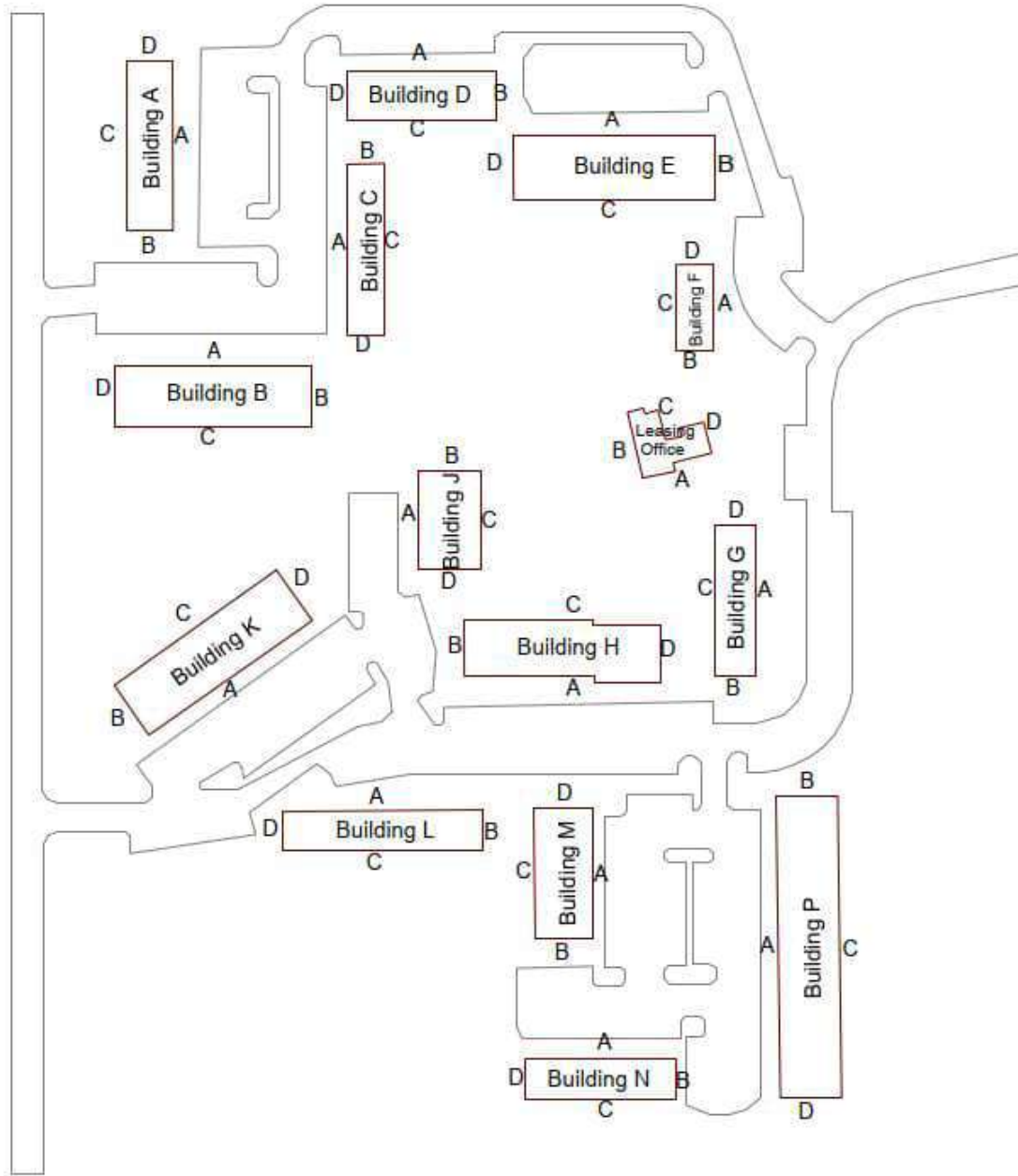
Willow Branch Apartments | Clarkston, Georgia

November 12, 2024 | Terracon Project Number HN247281A



## **APPENDIX F**

### **PB IN SOIL DRAWINGS**



|                  |    |
|------------------|----|
| Project Manager: | TG |
| Drawn by:        | MM |
| Checked by:      | TG |
| Approved by:     | TG |

|             |               |
|-------------|---------------|
| Project No. | HN247281A     |
| Scale:      | As Shown      |
| File Name:  | HN247281A     |
| Date:       | November 2024 |


**Terracon**

514 Hillcrest Industrial Boulevard  
Macon, Georgia 31204

|                                                                                     |
|-------------------------------------------------------------------------------------|
| Lead In Soil Map                                                                    |
| Willow Branch Apartments<br>822 North Indian Creek Road<br>Clarkston, Georgia 30024 |