

ENVIROSYSTEMS, AN AFFILIATE OF ENTHALPY ANALYTICAL
Laboratory Quality Assurance Manual
Cover Page

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LABORATORY QUALITY ASSURANCE MANUAL

Covering Environmental Toxicology, Microbiology and Analytical Chemical
Testing Services

ENVIROSYSTEMS, AN AFFILIATE OF ENTHALPY ANALYTICAL, LLC

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3.0 QUALITY ASSURANCE POLICY AND OBJECTIVES**3.1 Quality Assurance Policies and Objectives**

This manual details the quality assurance plan currently in effect at EnviroSystems, Incorporated (ESI). The company follows approved protocols, participates in performance evaluations and maintains Quality Assurance documentation as required by The NELAC Institute (TNI) and Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP), based on the ISO 17025 standard. Details regarding ESI's ongoing policies and procedures are outlined in this document and its subsequent revisions. The Quality Assurance policy and system covers all work conducted by ESI at its Hampton facility and, when applicable, at remote locations such as a temporary or mobile laboratory. Management is fully committed to the highest standards of professionalism and in providing its clients with data that is fully compliant with the goals and objectives of its quality assurance program.

The objectives of the QA program will include: providing professional services that ensure good quality data, continual assessment of laboratory operations, detection of training needs, ensuring client satisfaction, and improving laboratory functions.

Management at all levels is committed to a continual improvement in the company's quality system. This commitment is addressed in our quality assurance program and ensures that management, and technical and support staff are committed to the company's overall goal of improving quality and customer satisfaction.

Top management will communicate the importance of meeting customer, statutory, and regulatory requirements, and staff at all levels will make commitments to ensure that all operations follow the requirements. The company will ensure that staff are free from external pressures that could impact the integrity of data. In addition, the company requires that all staff adhere to the company's Ethics Policy and Data Integrity Program. For more information, refer to SOP QA-1125 "Ethics and Data Integrity".

3.2 Quality Assurance Documents

All quality assurance documentation (QA Manuals, Standard Operating Procedures (SOPs), etc.) and all reports will be generated in English, reviewed, and approved by authorized personnel. QA documents are periodically reviewed and revised to ensure continued suitability.

3.2.1 Quality Assurance Manual

This manual is a controlled document, which means that its identity, development, distribution, and status must be known and traceable at all times. Staff members can access the manual on the network at the following location: P:\QAU\SOPs\00 WORKING SOPs. Electronic copies of superseded material are stored in an archive folder in the appropriate QA subdirectory.

Copies of the QA Manual will be identified as being limited in use to a specific project and will have a release date included in the document header. A footer will contain the following statement: "This document is the property of Enthalpy Analytical, LLC. All information contained herein is confidential. No parts may be used or distributed without permission of Enthalpy Analytical, LLC." Every effort will be made to provide clients and regulators with the most current possible revision. Unless otherwise specified, the manual will be provided in Adobe Acrobat® PDF format. All files will be password secured documents. Security measures assigned to a document will, at a minimum, prohibit modification or editing

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of the material. Unless otherwise requested, copies of all electronic manuals shall contain a watermark specifying that the document is an uncontrolled document.

This document describes management policies related to the operation of the toxicology, microbiology and analytical chemistry laboratories. It provides overall guidance regarding acceptable practices and discusses each element of the Quality Assurance Program. The QA Manual is not an SOP, but is a distinct document that functions as the Project QA Manual where no other Quality Assurance Project Plan (QAPP), Statement of Work (SOW), or other contractually mandated project plan has been specified. Adherence to the practices described in this manual is required of all employees. The manual will be generated in sections, with each section having a number. All sections will be paginated using a "page # of total pages" format. The manual is reviewed at least annually and as needed. When revisions are made to sections of the manual, it will receive a new revision number, along with the date the revision was implemented. The Table of Contents will also contain these references. The QA manual may be revised or superseded only with the written authority of the approved signatories (see section 4 of this manual). Revisions and updates may only be made by a staff member with knowledge in the area being revised. If the QA Manual has not been revised in over 1.5 years, then the approved signatories must initial and date next to their signatures on the cover page to indicate updated approval of the manual.

Laboratory personnel must certify that they have read, understand and agree to abide by QA Manual policies during their initial training. Staff review and certification must also be completed on an annual basis. This manual may also be referred to regularly as a source of information. All personnel shall comply with the QA/QC requirements established in the QA Manual. In the event that a staff member is in doubt as to the appropriate Quality Assurance protocol in a given situation, the manual should be consulted. Omissions or errors should be immediately reported to the QA Director for corrective action. It is the responsibility of each laboratory staff member to ensure that the provisions of this manual are followed and that staff are aware of the current revision. Disagreement with specific requirements or knowledge of changes causing deviation from the procedures should be discussed with the Laboratory Director or appropriate supervisor before further work is completed. Laboratory personnel are encouraged to provide feedback on the manual and make recommendations for more efficient procedures.

This document is updated on a regular basis to reflect changes in laboratory conditions and protocols. When substantive changes are made, all staff will be appraised and provided with information on the change. The latest revision of each section of the manual is the applicable rule.

QA Manual sections will be as follows:

Section #	Title
1	Quality Assurance Manual Title Page
2	Table of Contents
3	Quality Assurance Policy and Objectives
4	Organization and Personnel
5	Quality Systems
6	Standard Operating Procedures and Test Methods
7	Sample Handling, Acceptance and Receipt
8	Laboratory Equipment and Preventive Maintenance
9	Calibration Procedures and Frequency

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- 10 Data Reduction and Reporting
- 11 Records Management
- 12 Complaint Management
- 13 Terms and Definitions
- 14 Certifications

3.2.2 Standard Operating Procedures

All procedures related to sample collection, storage, preparation, analysis, disposal, data validation, data reporting, employee training, and safety will be contained in written SOPs. See section 6.0 of this manual for information.

3.2.3 Corrective Action Reports

A Corrective Action Report (CAR) may be initiated when nonconforming work or departures from the quality system have been identified. The CAR will detail the steps that were taken by the QAU and staff to ensure that the source of the deviation was identified, and either brought under control or eliminated. Corrective actions should be appropriate to the magnitude of the issue. Corrective Action reporting will be through an in-house web-based system described in SOP QA-1134 "Corrective Action Report System". See sections 5.0 and 12.0 of this manual for more information.

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Page: 1 of 10**4.0 ORGANIZATION AND PERSONNEL****4.1 Corporate Identity**

EnviroSystems, Incorporated (ESI), is a wholly owned subsidiary of Montrose Environmental, Incorporated's Measurements and Analytics group, Enthalpy Analytical, LLC. ESI is legally incorporated in the State of New Hampshire and conducts business at 1 Lafayette Road, in the town of Hampton, Rockingham County, New Hampshire. EnviroSystems, Incorporated's date of incorporation was May 28, 1992. ESI's federal tax identification number is 02-0456472. Enthalpy Analytical's federal tax identification number is 46-4195044.

4.2 Company Organization

ESI provides a wide range of testing services related to environmental toxicology, analytical chemistry and microbiology.

It is important for efficient laboratory operation that all laboratory employees understand the operational structure, specific areas of responsibility, and lines of authority within the organization. It is equally important for laboratory personnel to understand that the structure of the Quality Assurance Unit (QAU) may be separate from other laboratory operations; however, the quality function is completely integrated into every aspect of laboratory operations.

The organizational structure of the laboratory is provided in Figure 4-1. Figure 4-2 provides a Montrose Environmental's Measurements and Analytics Division corporate organization chart providing the relationship between EnviroSystems, Enthalpy Analytical, and Montrose Environmental as it relates to corporate services and governance. Senior management will maintain the integrity of the management system and ensure that communication between staff and parent corporate entities exists as a means to establish an effective management system. The Laboratory Director is responsible for overall management of technical and administrative groups at the Hampton facility. The Laboratory Director reports directly to the Vice President of Enthalpy Analytical, LLC. Under the direction of the Laboratory Director, the staff are organized into the following functional groups: toxicology, microbiology, analytical chemistry, quality assurance, sales, customer service and hazardous waste. The manager of each functional group has direct oversight of technical operations within the group.

4.3 Position Descriptions

The laboratory will provide personnel with the authority and resources to carry out their duties, including the implementation, maintenance, and improvement of the management system. It is the individual responsibility of each staff member to perform their assigned functions according to the applicable SOPs, QA Project Plans (QAPPs), Study Protocols, and Work Plans. This includes responsibility for performing quality control measures as specified in the applicable method or protocol. Directors and Managers are considered to be key staff. If a Laboratory Director or Technical Manager is not able to perform the tasks required of the position for more than 15 consecutive days, then a temporary replacement will be appointed who has qualifications equal to the position. If a Laboratory Director or Technical Manager cannot meet the requirements of the position for a period of more than 35 consecutive calendar days, then appropriate accreditation agencies will be notified of the change in director/manager. Key management, Laboratory Director and Technical Managers positions will be full time positions and those holding the position will not hold similar positions at other accredited laboratories without the written permission from Montrose Environmental and ESI's accreditation body.

Personnel who hold specific positions are considered authorized signatories. These positions are: Laboratory Director, Technical Manager (Chemistry and Toxicology), Quality Assurance Director,

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Quality Assurance Officers (as members of the QAU), and Microbiology Manager. The above personnel are the signatories for this manual.

The approved signatories for items related to client reports are described further in sections 10.3.6 and 10.3.7. The signatories for Standard Operating Procedures (SOPs) are denoted as "QA Manager" and "Manager". These signatories are general titles as "QA Manager" shall be the QA Director or QA Officer and "Manager" shall be the appropriate manager. Descriptions of position requirements and responsibilities are detailed in the following subsections.

4.3.1 Laboratory Director

The Laboratory Director is an administrative position and will have overall responsibility for directing the technical management and development of the company. The Laboratory Director will ensure that the company has the technical capability of providing professional services that ensure good quality data, ensuring client satisfaction and improving laboratory performance. The Laboratory Director with support from Montrose Environmental and Enthalpy Analytical will periodically evaluate the scope of services provided by ESI, and will assess the growth and direction of the company's development. The Laboratory Director will work with the Quality Assurance (QA) Director to conduct an annual review of the company's quality systems in order to ensure they are adequate and meet program requirements. The Laboratory Director, or designee, will approve modifications to the quality system. The Laboratory Director will report to the Senior Vice President of Services within the Environmental Laboratory Services group. Technical Managers, the Client Services Group, QA Director, and the Financial Analyst will report to the Laboratory Director to keep corporate management aware of issues that may negatively impact quality, integrity and performance.

4.3.2 Technical Manager of Toxicology

The Technical Manager of Toxicology is a full time permanent position that oversees the growth and development of the toxicology group. The Technical Manager will have direct oversight over the toxicology laboratory. The minimum educational and professional qualifications for the Technical Manager of Toxicology position will be a Bachelor's degree from an accredited college or university in microbiology, chemical, environmental, biological, or physical sciences with at least 16 college semester credit hours in general biology and at least 2 years of related professional experience. A master's or doctoral degree in one of the above disciplines may substitute for 1 year of experience. The Technical Manager of Toxicology will work with the Toxicology Section Leaders to bring out-of-control events back to within established acceptance limits. The Technical Manager of Toxicology will report to the Laboratory Director to provide information on the performance of the individual units and ensure that work is conducted in conformance with the QA program, SOPs, and client-specific sample analysis plans.

4.3.3 Technical Manager of Analytical Chemistry

The Technical Manager of Analytical Chemistry is a full time permanent position that oversees the growth and development of the analytical chemistry group. The Technical Manager will have direct oversight over the analytical chemistry laboratory. The minimum educational and professional qualifications for the Technical Manager of Analytical Chemistry position will be a Bachelor's degree from an accredited college or university in chemical, environmental, biological, or physical sciences with at least 24 college semester credit hours in chemistry and at least 2 years of related professional experience. A master's or doctoral degree in one of the above disciplines may substitute for 1 year of experience. The Technical Manager of Analytical Chemistry will approve standards for QC control limits and work with the Inorganic and Organic Section Leaders to bring out-of-control events back to within established acceptance limits. The

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Technical Manager of Analytical Chemistry will report to the Laboratory Director to provide information on the performance of the individual units and ensure that work is conducted in conformance with the QA program, SOPs, and client-specific sample analysis plans.

4.3.4 Quality Assurance Director

The Quality Assurance (QA) Director will be responsible for the quality system and for conducting or overseeing the following: systems and department audits, inspections for compliance with the QA Manual and SOPs, as well as maintaining QA document archives. The QA Director is responsible for evaluating data objectively and assessing without outside influence. The minimum educational and professional requirements for the QA Director position will be a Bachelor's degree from an accredited college or university in a biological, chemical, environmental, or physical sciences. Alternatively, four years experience in the areas of management, quality assurance, environmental toxicology or analytical chemistry will meet the position specification. The QA Director will have general knowledge of analytical methods for which data review is performed. The QA Director will be independent of operations over which they have oversight. The QA Director will work directly with Managers and Section Leaders to ensure that the objectives of the QA Manual are being met, SOPs are current, and work is conducted in conformance with these documents. The QA Director will notify management of deficiencies in the quality system.

4.3.5 Financial Analyst

The Financial Analyst will be responsible for all on-site accounting procedures plus coordination of purchasing in accordance with Montrose Environmental policies. The position requires a background in accounting or office administration with a Bachelor's degree from an accredited college or university. An Associate's degree and 5 years experience in accounting practices may be substituted for the Bachelor's degree. The Financial Analyst reports to the Laboratory Director and works in conjunction with Montrose Environmental support groups including Shared Services, NetSuite accounting services, and Concur purchasing systems.

4.3.6 Client Services Group

The Client Services Group, sometimes referred to as Project Managers, are responsible for maintaining client contacts and service as an interface between the client and the technical staff. Members of the Client Services Group will work to ensure that client's time lines are provided to technical units, monitor technical performances to ensure that time lines are met, and update clients if changes in schedules are necessary. Members will also address issues raised by clients and provide appropriate feedback. Members of the Client Services Group will prepare quotations, obtain and disseminate new project documentation (SOWs, QAPPs, etc.), and be involved in the reporting process. The minimum educational and professional requirements for a member of the Client Services Group will be a Bachelors degree from an accredited four year college or university in a biological, chemical or environmental science discipline. Alternatively, four years experience in the areas of management, environmental toxicology or analytical chemistry will meet the position specification.

4.3.7 Microbiology Manager

The Microbiology Manager is responsible for the planning and execution of any Microbiology project that is acquired. The minimum educational and professional qualifications for the Microbiology Manager position shall be a Bachelor's degree from an accredited college or university in chemistry, microbiology, biology, environmental, or physical sciences with a minimum of 16 semester credit hours in general microbiology and biology. The individual should

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also have at least 2 years of related experience. The individual and designated staff of laboratory personnel will ensure that the laboratory has the facilities and equipment required to successfully complete the project, will advise as to any special training or equipment needs, and will advise on the best and proper way of carrying out the task at hand. The Microbiology Manager will ensure that studies carried out by the laboratory will be conducted in compliance with the company's overall QA Manual, general and study specific SOPs, and project schedules.

4.3.8 Hazardous Waste and Safety Coordinator

The Hazardous Waste and Safety Coordinator is responsible for ensuring that the proper waste disposal procedures mandated by the New Hampshire Department of Environmental Services (NH DES) are being followed. This includes identifying waste materials, training others on the proper safety guidelines to follow, and working with hazardous material disposal firms to ensure proper handling of generated wastes. Additional responsibilities may include: evaluating and coordinating storage and handling, lead efforts to clean up contaminated soil or water, compile storage and disposal reports. This position is responsible for the coordination and maintenance of the laboratory's safety, chemical hygiene and emergency management programs. This position is also responsible for educating all staff members in safety awareness and health issues, housekeeping and chemical/sample hygiene, first aid, waste management and emergency procedures. The coordinator will be responsible for the management of Safety Data Sheet (SDS) database and the chemical inventory. The coordinator will conduct regular inspections to ensure that the laboratory facilities, including waste storage, are in safe working order and comply with appropriate regulations. The coordinator will ensure that the facility and operations in the laboratory conform to local, state and federal requirements, and will work with all staff members to identify any issue that might negatively impact the health and safety of any employee. The Hazardous Waste and Safety Coordinator will receive assistance and support for Montrose Environmental's Safety Group and the Shared Services teams. The minimum educational and professional qualifications for the coordinator position shall be a Bachelor's degree from an accredited college or university in a science related field plus successful completion of the Basic Hazardous Waste Coordinator Training program offered by the NHDES. An Associate's degree and a minimum of 2 years experience working in a laboratory environment is considered an acceptable alternative to the Bachelor's degree.

4.3.9 NPDES and ERA Section Leaders

NPDES and Ecological Risk Assessment (ERA) Section Leaders are the lead technicians in the laboratory and are responsible for ensuring all day-to-day activities in the laboratory are completed. The minimum educational and professional qualifications for the Section Leader position shall be a Bachelor's degree from an accredited college or university in a science related field and 2 years professional experience in the area of environmental studies. The individual and designated staff of laboratory personnel will assist in ensuring that the laboratory has the facilities and equipment required to successfully complete the project. Section Leaders will advise as to any special training or equipment needs, and will advise on the best and proper way of carrying out the task at hand. Section Leader will confirm samples login data and update the Client Services Group on project statuses, and support the Technical Manager in ensuring that studies carried out by the laboratory will be conducted in compliance with the company's overall QA Manual, general and study-specific SOPs, and project schedules.

4.3.10 Quality Assurance Unit Support Staff

The Quality Assurance Unit (QAU) support staff is a technical group that assists the QA Director. Members of the support staff group may be referred to at times as QA Officers. The minimum educational and professional qualifications for the Section Leaders position shall be a

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Bachelor's degree from an accredited college or university in a science related field and 2 years professional experience in the area of environmental studies. Members of the QAU are selected by the QA Director to provide administrative support and technical expertise and may include analysts and other members of the technical and general staff. Responsibilities of the QAU may include: conducting internal audits and inspections, data reviews, Corrective Action Report (CAR) reviews and closings, development of responses, and other administrative tasks. QAU support staff will be independent of operations over which they have oversight whenever possible.

4.3.11 NPDES and ERA Technicians / Analysts

NPDES and Ecological Risk Assessment (ERA) Technicians and Analysts are responsible for the conduct of toxicity testing programs. NPDES and Eco Risk Technicians and Analysts may also be involved in statistical analysis of data, data auditing, review of QA/QC reports and laboratory compliance. Minimum educational and professional qualifications for the full-time, permanent position will be a Bachelor's degree from an accredited college or university in a science related field. NPDES and Eco Risk Technicians and Analysts will report to their immediate Group Leader.

4.3.12 Organics and Inorganics Section Leaders

The Organics and Inorganics Chemistry Section Leaders are the lead analysts in the laboratory and are responsible for ensuring all day-to-day activities in the laboratory are completed. The minimum educational and professional qualifications for the Section Leader position shall be a Bachelor's degree from an accredited college or university in a science related field and 2 years professional experience in the area of environmental studies. The individual and designated staff of laboratory personnel will assist in ensuring that the laboratory has the facilities and equipment required to successfully complete the project. Section Leaders will advise as to any special training or equipment needs, and will advise on the best and proper way of carrying out the task at hand. Section Leader will confirm samples login data and update the Client Services Group on project statuses, and support the Technical Manager in ensuring that studies carried out by the laboratory will be conducted in compliance with the company's overall QA Manual, general and study-specific SOPs, and project schedules.

4.3.13 Organic and Inorganic Chemistry Technicians / Analysts

Organic and Inorganic Chemistry Technicians and Analysts are responsible for the conduct of analytical chemical support testing programs. Organic and Inorganic Chemistry Technicians and Analysts may also be involved in statistical analysis of data, data auditing, review of QA/QC reports and laboratory compliance. Minimum educational and professional qualifications for the full-time, permanent position will be a Bachelor's degree from an accredited college or university in a science related field. Organic and Inorganic Chemistry Technicians and Analysts will report to their immediate Group Leader.

4.3.14 Microbiology Technicians / Analysts

Microbiology Technicians and Analysts are responsible for the conduct of microbiology analyses and quality control components of the microbiology laboratory. Minimum educational and professional qualifications for the full-time, permanent position will be a Bachelor's degree from an accredited college or university in a science related field. Microbiology Analysts will report to the Microbiology Manager.

4.3.15 Support Staff

Support staff members are responsible for working in conjunction with other staff

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members. Responsibilities will include, but are not limited to: general laboratory cleaning, (glassware, counters, floors, etc.), stocking of consumable equipment, preparing lab equipment and paperwork for testing, picking up and/or logging in samples, preparing and sending out bottle orders, and other extraneous tasks in support of laboratory operations. Additionally, support staff may be involved in preparation for assays, including but not limited to: labeling test chambers, maintaining brood boards, and logging samples into the sample management database. Support staff may also participate in conduct of assays with proper training and supervision. Involvement shall include, but is not limited to: tasks including recovery of organisms from sediments or soils, taking water samples for daily water quality measurements, and measurement of general water quality parameters. The minimum qualification for this position is at least 17 years of age and a High School Diploma.

4.4 Orientation

Each new employee receives a multi-part orientation consisting of a safety orientation, quality assurance orientation, and human resources orientation. The safety orientation is an examination of the Hazard Communication and Safety SOP, which is consistent with the requirements of OSHA's Hazard Communication Program (29 CFR 1910.1200). The quality assurance orientation provides the new employee with information on the QA program through an introduction to the QA Manual and the SOP directory, acceptable record keeping practices, and the individual's responsibility as a staff member. The human resources orientation involves matters of immediate personal concern such as benefits, salary and company policies. The human resources orientation also serves to address ethics and confidentiality issues.

4.5 Training

Training is a process used to assist laboratory personnel in their professional development. The goal of the training program is to ensure that all staff are adequately trained for the tasks they undertake. The training techniques utilized include:

- On-the-job training
- Programmed learning
- Conferences and seminars
- Specialized training by instrument manufacturers
- Participation in check-sample or proficiency sample programs

Management and the QAU shall be responsible for staff training programs. Training shall be conducted for each individual on each procedure to be performed. No individual shall conduct any analysis, experimental procedure or other professional function without continuous direct supervision until training in that procedure has been completed and the individual's ability to produce acceptable results has been observed and documented. Proficiency will be determined through the completion of reference toxicant assays or analysis of reference or proficiency evaluation samples. Written records of training activities shall be generated by the appropriate Manager, Section Leader, or QAU member and forwarded to the QA Director and Technical Manager.

The Section Leader is responsible for providing documentation of training and proficiency. The QAU maintains a training file for each employee. The training file will be independent from other personnel records and will include checklists of basic and advanced laboratory activities, a listing of all SOPs read, comprehended and understood by the analyst, as well as copies of reference or proficiency testing data. An individual may inspect their training file at any time.

All educational transcripts will be held and updated as necessary for laboratory staff members.

4.6 ESI Confidentiality / Proprietary Policy Statement

This document is the property of Enthalpy Analytical, LLC. All information contained herein is confidential. No parts may be used or distributed without permission of Enthalpy Analytical, LLC.

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All reporting information, testing materials and client proprietary information is considered confidential and the property of the client for whom the test is conducted. As such, details may not be disclosed with any person or business outside of the company without expressed written permission from the client.

All software and computer applications purchased by the company are considered company property and may not be copied for personal use.

Any company related publications (with the exception of sales materials), internal forms, in-house informational material or company developed procedures and computer programs are considered company property and therefore confidential and will not be copied, transferred, sold or otherwise disbursed for any use beyond the company.

Any deviations or violations of this policy statement will be addressed by management and can be considered grounds for immediate dismissal.

4.7 Employee Relations

It is company policy to provide a workplace atmosphere where employees are free from undue outside influences that could adversely impact their performance and the quality of their work. To this end the company's overall employment policies are designed to provide an open working relationship and encourage employees to bring potential problems to management so they may be addressed prior to becoming issues that could impact performance. This policy includes all aspects of operations from safety, study design, employee attitudes and relationships with other staff members.

4.8 Ethics

All staff members will work to ensure that all operations carried out by the laboratory are in compliance with the company's stated goals for quality and that any deviations from those goals or the company's ethics policy are reported to appropriate supervisor. It is company policy that management will develop and implement procedures designed to educate its staff on their ethical and legal responsibilities as they relate to their activities at the company. It is the objective of this policy to ensure that the staff are aware of proper actions and activities regarding analysis of samples or data and client confidentiality. The procedures will also be designed to make employees aware of potential penalties for unethical and illegal actions.

To ensure that all employees are aware of the company's ethics policy, a copy of the Ethics and Data Integrity SOP will be incorporated into the basic package that all new hires are required to review and understand. Additionally, there will be an annual company-wide review of the ethics and data integrity policy with mandatory attendance. The objectives of the program will be reviewed and employees informed that compliance with the policy is of the utmost importance, and there will never be any instance of penalizing an employee for identifying deviations from the policy.

4.9 Data Integrity

ESI has established and maintains a documented data integrity plan. The primary elements of the plan are:

- Data integrity training with signed documentation for all laboratory employees
- In-depth, periodic monitoring of data integrity
- Data integrity procedure documentation. The data integrity procedures shall be signed and dated by senior management. Senior management shall annually review and update data integrity procedures as needed. The details for data integrity training and documentation are provided in SOP QA-1125 and the company's Data Integrity Plan.

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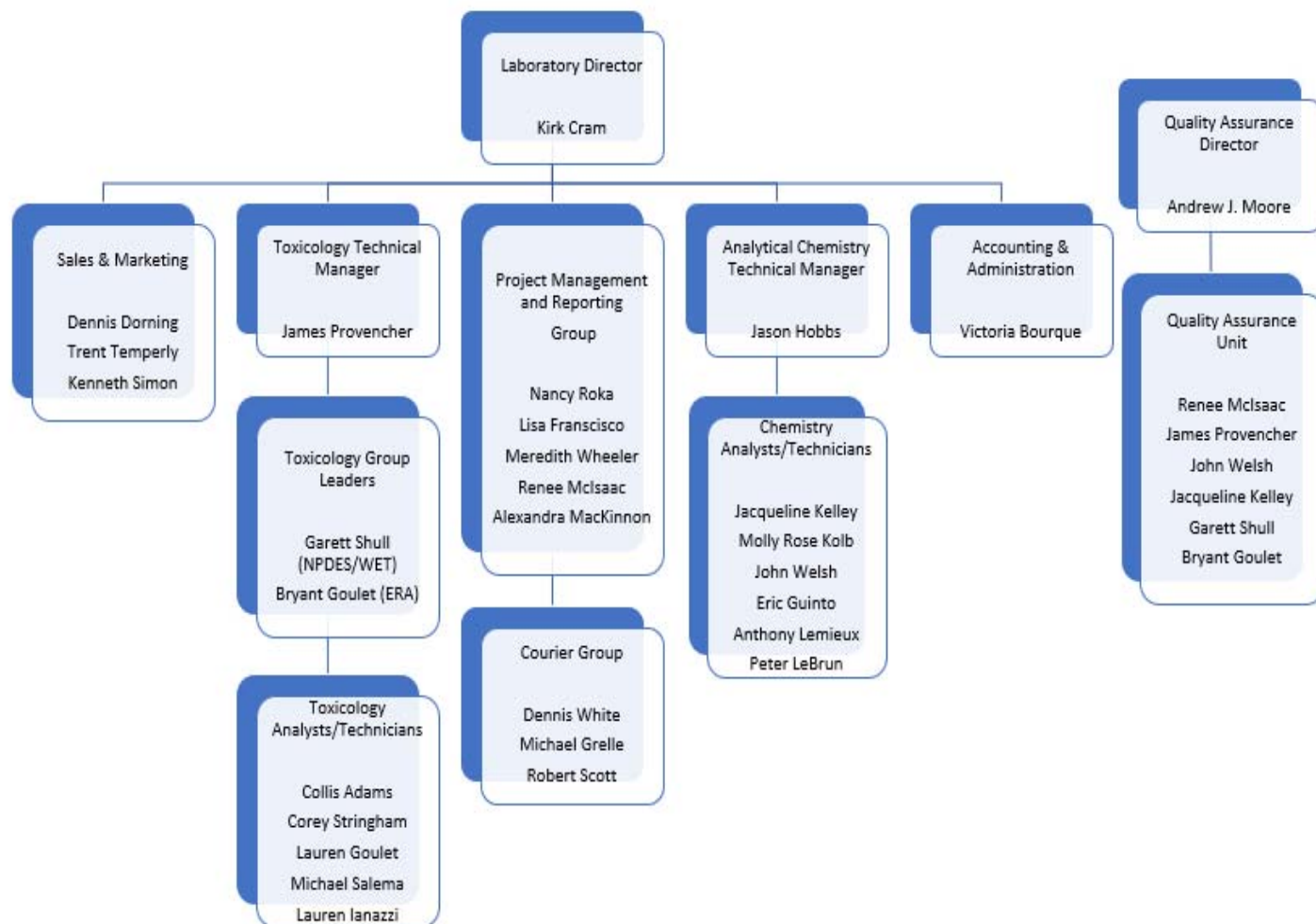
Management shall provide procedures for, and encourage, confidential reporting of data integrity issues in the laboratory. These procedures will ensure confidentiality and a receptive environment to employees, so they may privately discuss ethical issues or report items of ethical concern. In instances of ethical concern, these procedures shall include a process whereby laboratory management is to be informed of the need for any further detailed investigations.

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Figure 4-1. Enthalpy Analytical, Hampton - Organization Chart

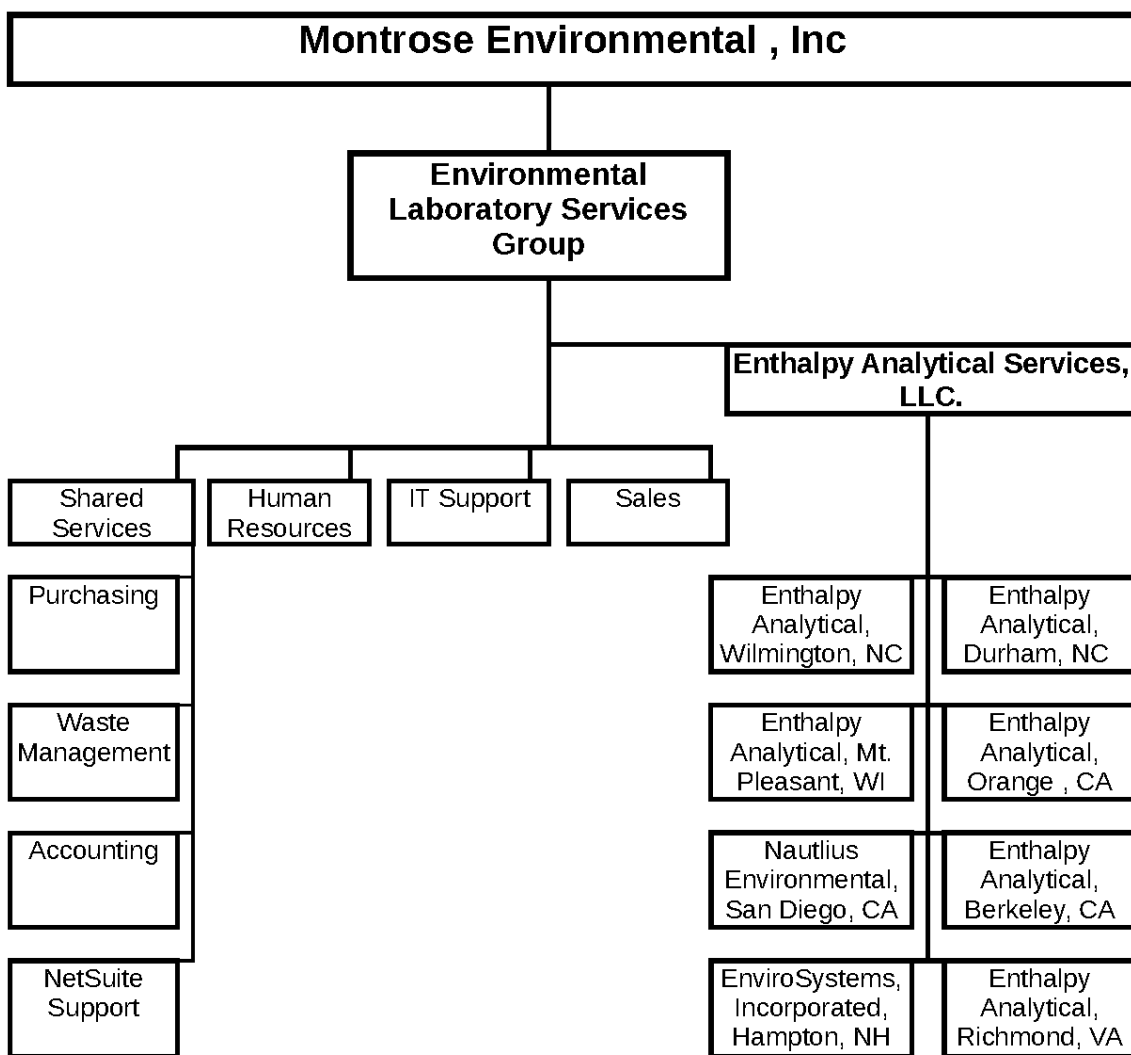
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Figure 4-2. Montrose Environmental, Inc. - Organization Chart



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5.0 QUALITY SYSTEMS

Audit and surveillance results, control charts, proficiency testing results, data analysis, corrective and preventive actions, customer feedback, and management reviews are tools used by the QA Director or designee to maintain and improve the management system.

The laboratory participates in a variety of inter-laboratory tests, performance checks and audits to provide periodic assessment of the effectiveness of the overall quality control program. Prior to initiating a new test procedure, the laboratory will conduct performance checks and audit all aspects of the test to ensure data generated is compliant with quality guidelines. The same process holds for instances where there has been a significant change in an analytical method or a new piece of equipment is entered into service.

5.1 Inter-Laboratory Performance Evaluations

The laboratory participates in performance evaluations on a regular basis. Evaluations are conducted for both bioassay and chemical parameters. ESI participates in the following studies:

Proficiency Test:	Frequency:
Water Pollution Evaluation (WP)	Biannually
Water Supply Evaluation (WS)	Biannually
Soil Sample, for analytical chemistry analyses	Biannually
DMR Evaluation, for bioassay analyses	Annually

Laboratory proficiency tests (WP, WS and soil studies) for analytical chemistry parameters must be successfully completed at least twice per year and approximately six months apart; one of which is run in conjunction with the annual DMR Bioassay Evaluation. Performance samples must be acquired from a NIST approved supplier. The samples must be handled by the laboratory in the same manner as any unknown environmental samples. Upon receipt, samples will be logged into the laboratory system and given a study number, and distributed to appropriate laboratory managers for processing.

Analysis will be by the method routinely used in the laboratory for the specified parameter. Data is reviewed and reported to the sample provider by the study deadline. Once the official results are received by the sample provider, they may be reviewed by the Quality Assurance Unit (QAU), the Technical Manager and the analyst responsible for the analysis. Results of proficiency tests are entered into a spreadsheet for summary purposes. Results of provider reports and copies of raw data associated with proficiency samples will be maintained by the QAU.

If results of a proficiency test fail to meet acceptability criteria, then the unsatisfactory results are subjected to corrective action. A new sample shall be ordered from the provider and analyzed as soon as allowed under the program limitations, and then reported. A portion of any retained material may be tested to determine if an acceptable value is obtained. If this is the case, the data from the original submission is to be evaluated to determine, as practical, the source of the error.

5.2 Internal Audits

Internal audits occur at least annually and in accordance with a predetermined schedule. The audit schedule shall ensure that all areas of the laboratory are reviewed over the course of one year. The review shall include both technical and quality system areas. The review shall also include raw electronic data files derived from test reports. Internal audits typically focus on performance relative to a Standard Operating Procedure (SOP) or other protocol. The purpose of an internal audit is to verify that laboratory operations comply with the requirements of the quality system.

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Internal audits may be conducted by the QA Director or by a trained and qualified members of the QAU. The QA Director will determine if a person carrying out an audit has sufficient knowledge in order to conduct the audit. Persons carrying out an audit shall have sufficient knowledge of the process being audited to understand and be aware of the requirements of the process under investigation. Unless otherwise unavoidable, a person should not audit their own work. If this is necessary, then a member of the QAU should be present to observe the audit.

The laboratory conducts internal audits that include thorough reviews of procedures and documents. Audits are designed to confirm that work was performed in accordance with the QA Manual, applicable SOPs and any project specific documents, as well as ensuring that adequate documentation exists to satisfy the requirements of the project. Laboratory systems audits are classified into three types: quality systems, systems and project audits.

5.2.1 Quality Systems Audits

Quality systems audits will be conducted on an annual basis and will be scheduled at the start of the year. This type of audit focuses on specific elements of the quality program (Figure 1 provides a list of the elements). The quality system is audited against TNI and DoD standards to evaluate its continuing suitability and effectiveness.

5.2.2 Systems Audits

Systems audits address general laboratory operations, either within a specific department, or laboratory-wide conformance to the QA Manual and applicable SOPs. Audit checklists are prepared to address relevant QA concerns with a series of questions or points, to which compliance or non-compliance is determined through interview and inspection. Checklists are based on protocol requirements, EPA laboratory evaluation criteria, provisions of the QA Manual and ESI SOPs. Systems audit checklists will cover, where applicable, the following areas:

- Methods/procedures
- Training and proficiency
- General operations
- Record keeping

5.2.3 Project Audits

Project audits address the QA details of a specific project. Audit checklists are prepared to address relevant QA concerns with a series of questions or points, to which compliance or non-compliance is determined through interview and inspection. Project audit checklists may be drawn from the project Quality Assurance Project Plan (QAPP), as well as relevant provisions of the QA Manual, SOPs or published protocols. Project audit checklists will cover, where applicable, the following areas:

- Sample management
- Sample preparation
- Test organisms
- Conduct of project
- Data and statistical analysis
- Reporting

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If requested, the laboratory will cooperate with clients and their representatives in providing clarity and monitoring of work performed, including live audits, so long as other client's confidentiality is not compromised.

5.2.4 Audit Reporting

Each audit is immediately followed by a debriefing, in which the auditor discusses their findings with the laboratory supervisors. The debriefing serves a two-fold purpose: laboratory management is afforded an early summary of findings (which allows them to attempt to identify the cause of the issue and begin formulating corrective strategies) and it provides the auditor with an opportunity to test preliminary conclusions (which allows for the correction of any misconceptions).

The audit report, which may or may not contain performance audit findings, is issued to the appropriate manager and personnel, for response and corrective actions (when necessary). The report, where applicable, includes recommendations for options that would eliminate future occurrences of the issue under investigation. In cases where more than one option is available, technical staff and management will review the options and select the one most likely to prevent reoccurrence of the issue. All corrective actions are documented.

5.2.5 Corrective Actions for Audits

Corrective actions developed in response to internal audits will be implemented in a timely and responsive manner. Once a corrective action has been implemented, the process should be audited again to ensure the action was effective and that other issues have not resulted in response to the change.

5.3 Management Reviews

Management reviews are also conducted on an annual basis by the QAU. Management will present findings to all staff during the first quarter of the following year and address any issues that may arise based on the presentation within 30 days. The review considers the following elements:

- Suitability of policies and procedures
- Reports from managers and supervisors
- Outcome of recent internal audits
- Corrective and preventive actions
- Assessments by external bodies
- Results of interlaboratory comparisons and proficiency testing
- Changes in type or volume of work
- Client feedback
- Complaints
- Recommendations for improvement
- Other relevant factors

5.4 Traceability

An objective of the quality assurance policy is to document traceability of data generated by the laboratory. All generated data will be collected in such a manner that subsequent review of the records will allow for generation of similar findings. Procedures put into the QA Manual and individual SOPs will provide sufficient instruction to allow for information to be collected and maintained so that data sets can be reconstructed. This will include, but is not limited to: logs for sample preparation, preparation of reagents and instrument condition run logs.

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Data reduction procedures will be specified where appropriate. Any deviations will be fully documented and explained. To be able to identify analysts involved in testing, the names, signatures or initials of staff conducting an analysis are included on appropriate data files, logs and bench sheets.

All forms and source documents generated by the laboratory that are covered by the quality system must have a unique identifier, this includes records such as: bench logs, data forms, worksheets, sample receipt logs and standards preparation logs. At a minimum, document identifiers will include the name of the file, its location on the network and the year it was generated.

5.5 Contract Review

Its company policy to review all contracts received for the conduct of testing services to ensure that the laboratory has the capability and resources to meet the contract requirements. Contracts will also be forwarded to the legal department of Montrose Environmental Group for review. The appropriate environmental test method shall be selected to meet the client's requirements. Additionally, the review will address issues related to having the necessary facility and personnel to complete the study within the time limits specified by the contract. The company shall also notify the client of any potential conflict, deficiency, lack of appropriate accreditation status or inability on the laboratory's part to complete the work.

Records are maintained of pertinent discussions with the client relating to: the requirements and the results of the work during the period of the contract, and any work that is subcontracted by the laboratory. If differences exist between the client's proposed scope of work and services being provided by or through the company, then they will be presented to the client and agreed to prior to receiving any samples. If there is a change in a project once work has started, then the appropriate staff will be notified of the changes to ensure the contract has the same review as the original. If the work can not be completed by the laboratory either due to time or technical considerations, then the client will be notified and an approved subcontract laboratory will be sought to complete the requested services. Clients will also be notified of any contract deviations in a timely and responsive manner. Client-required deviations, additions or exclusions from the documented procedure are recorded in detail and included in the documents containing the results. As appropriate, notes regarding contract review will be saved in a client specific subdirectory. Copies of emails related to project scope or any segment of the project may also be placed in the client specific subdirectory. For Department of Defense (DoD) projects, waivers from the Quality Systems Manual (QSM) must be requested in writing and shall include technical justification.

In the event a client requests an extraordinary analysis, then the request will be reviewed. Upon approval, a project-specific document will be generated detailing the variance from standard procedures and protocols.

5.6 Data Processing

5.6.1 Data Entry and Validation

Any observations made during analysis are recorded in notebooks or on bench sheets. Records will include sufficient information in order to clearly document the task or work element with which they are associated. Any manual calculations or data transfers made as part of the analytical process will be checked when entered into the log or bench sheet to ensure that the reported data are free from transcription and calculation errors, and to ensure all quality control measures are reviewed and evaluated before data are reported. Data transfers and calculations will also be checked to address manual integrations. The laboratory analyst initiates the data validation process by reviewing the data for completeness and validity per acceptance criteria.

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5.6.2 Technical Review and Statistical Analysis

The reporting staff members provide a technical review for accuracy according to laboratory protocols. Statistical analysis is performed when necessary. The manager or designee will periodically review manual calculations to ensure correctness. Computations automatically made by a program will be verified when the program is written or, if purchased, when first run. If a computational program is edited, the correctness of computations will be checked.

5.7 Corrective Action Reports

When errors, deficiencies, unusual occurrences, or out-of-control situations exist, the QA program provides systematic procedures called "corrective actions" to resolve problems and restore proper functioning to the system. Corrective Action Reports (CARs) are produced by using an in-house web-based system detailed in SOP QA-1134. All staff members are enabled to initiate a CAR and once one has been initiated, the QA Director or QAU will review the nonconforming issue and either take responsibility or assign the task. This ensures that nonconforming issues are appropriately addressed and corrected. An investigation to determine the root cause will begin. The investigation will include the selection and implementation of corrective action that is likely to prevent recurrence. Corrective action is appropriate to the magnitude and risk of the problem. Any changes resulting from corrective action should be documented in the CAR. Examples of the types of situations that would necessitate a CAR initiation are: an out-of-control occurrence, an unusual occurrence, an audit, an improvement to a method or process, as well as customer complaints, compliments, questions or comments (further discussed in section 12 of this manual). All CARs will be monitored by the QA Director or designee to ensure effectiveness.

For DoD-specific projects, the laboratory must report any instances of inappropriate and prohibited laboratory practices to the accrediting body within 15 days of discovery. Records of associated corrective actions taken or proposed correction actions must be submitted within 30 days of discovery. Failure to notify the accrediting body may result in suspension of accreditation.

5.7.1 Nonconforming Data

If nonconforming data are found during data processing, then a corrective action may be initiated and a CAR may be generated. A determination will be made as to the severity of the nonconforming issue. If the issue is determined to have no significant impact on data quality, then the report may be issued with appropriate qualifications. If the report has already been issued, then a revised report will be issued. For a complete discussion on revised reports see Section 12.4.1.

If the nonconforming issue is determined to have significant impact on data quality, then the client will be notified directly either by phone or email within 15 business days of discovery. A Corrective Action Report (CAR) will be initiated to track corrective action effectiveness. Records of the corrective actions taken or proposed correction actions to resolve the nonconformance shall be submitted to the customer within 30 business days of discovery. Resumption of work will occur based on client correspondence and as directed by the Lab Director.

5.7.2 Out-of-Control Events

An out-of-control event is any event which is beyond the acceptance limits established for laboratory operation by SOPs, published methods or project specific

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documents. This can be the result of data that are outside the acceptable bounds for accuracy, precision or method contamination. An out-of-control event can also occur when an instrument is not properly calibrated or maintained. In some cases, investigation of an out-of-control event will reveal no problems, therefore, no corrective actions are necessary (this should be stated in the CAR).

5.7.3 Unusual Occurrences

An unusual occurrence is a situation in which laboratory operations are compliant with the protocol or SOP, but an atypical or undesirable incident has occurred, which warrants further investigation. An unusual occurrence event does not readily cause an immediate obvious effect on data quality, and is more subjective and difficult to identify than an out-of-control event. Such an occurrence could be a laboratory mishap resulting in an incomplete data set, significant mortality in only one replicate of a bioassay or instrument failure. All staff in the laboratory are responsible for reporting these "system" problems to management.

Conclusions that the occurrence was not typical or unreasonable, will be based on the professional judgement of the analyst, auditor or data reviewer. Often, investigation into unusual occurrences may not identify a direct cause (i.e. significant mortality in one replicate of a test treatment), or the cause may not warrant significant investigation (laboratory mishap caused a test replicate to be lost).

5.7.4 Preventive Action Plans

When an out-of-control event or patterns of an "unusual occurrence" are reported, the laboratory will conduct a review of the QA systems and technical programs, in order to determine if current systems should be revised. Additionally, the root cause of the non-conforming issue is to be reviewed to determine if a program or policy can be initiated that prevents subsequent occurrences of the issue.

Once a preventive action plan has been established, the process will be audited through follow up inspections, to ensure that the plan is effective in eliminating the nonconformance and that other issues have not developed in response to the action plan. The inspections and audits should be scheduled on the electronic calendar associated with the email program to ensure that they are preformed (reminders can also be scheduled). Results of the inspections will be included in the CAR as part of the process to close a report.

Modifications of the CAR plan will be reviewed by the QAU and management to ensure that the goal and objective of the plan remain in compliance with current ISO 17025 standards.

5.8 Quality Control Measurements

The quality control program provides a systematic process to ensure the validity of analytical results. This is accomplished by evaluating method accuracy, precision and quality control sample performance. Quality control requirements for an analysis are established to meet the requirements of the analytical method. In cases where there is no defined limit or the client has established a more rigorous limit, the more rigorous limit will be set as the standard for that particular test at that time. It should be noted that some of the terms and procedures noted in this section relate to analytical chemical measurements and are not applicable to bioassay methods.

5.8.1 Analytical Chemistry Quality Control Samples

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The results of quality control samples created in the laboratory represent estimates of accuracy and precision for the preparation and analysis steps of sample handling. This section describes the quality control support provided by each of these analytical measurements. Information on the procedures to follow in preparation of the samples or spiking solutions is described for each method and matrix in the respective method SOP.

5.8.1.1 Laboratory Control Sample and Duplicate

The Laboratory Control Sample (LCS) and Laboratory Control Sample Duplicate (LCSD) consist of aliquots of ideal matrices (water, sand, etc.) spiked with analytes of interest. They provide a measure of accuracy by showing that the laboratory is performing the method within accepted guidelines without potential non-matrix interferences. When prepared and analyzed, LCS/LCSDs can also provide a measure of overall precision and an estimate of bias based on recovery of the compounds from a clean control matrix.

LCSs for methods with extensive lists of analytes that may interfere with one another may include a limited number of analytes. However, the analytes included must be representative of as many analytes as is practical. In the case of metals analysis, all analytes of interest must be included. Laboratory pure water is used to prepare most LCSs for methods analyzing aqueous samples. Highly characterized solids, where available, are used as LCSs for methods analyzing solids. Where no such solid LCS is available, spiked alternative substrates may be substituted. These alternative substrates may include, but are not limited to: teflon chips, clean quartz sand and ice.

5.8.1.2 Matrix Spike and Duplicate

Matrix Spike (MS) and Matrix Spike Duplicate (MSD) provide a measure of accuracy and are similar to the LCS, except the analytes used for spiking are added to a second and third separate aliquot from the same container of a randomly selected client sample in an analytical batch. When prepared and analyzed, MS/MSDs can also provide a measure of overall precision. They incorporate sample matrix effects and field conditions.

5.8.1.3 Sample Duplicate

A sample duplicate is a sample that has been homogenized and split into two equal portions before the method sample preparation process. It measures sample precision associated with the preparation through analysis.

5.8.1.4 Preparatory Blank

A preparatory (prep) blank is an analytical control consisting of all reagents that is carried through the entire analytical procedure. For aqueous samples it is usually laboratory grade water and for solid samples it is a purified solid matrix. The volume or weight of the blank must be approximately equal to the sample volume or weight processed. Analysis of the blank verifies that method interferences caused by contaminants in solvents, reagents, glassware, and other sample processing hardware are known and minimized. Optimally, a prep blank should contain less than the detection limit for all parameters unless otherwise specified in the method or project QA plan. Results of prep blank analyses are maintained with other QC data in the respective laboratories/departments. If requested by the client, these data will be included in the report.

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5.8.2 Laboratory Control in Biological Testing

The laboratory control is included in all bioassays to establish the relative health of a test species. The laboratory control is prepared from either culture media, a standard water, or soil used in the laboratory. The laboratory control treatment is subject to the same specifications as all other treatments in the assay. Results are included in all reports.

5.8.3 Quarterly Verification of the Limit of Detection (Analytical Chemistry)

A Limit of Detection (LOD) sample shall be prepared by using a clean matrix, (deionized, distilled laboratory water for water samples and a purified solid matrix for soil or sediment samples), and a standard containing the analyte of concern. The LOD sample shall be spiked at a concentration approximately two to three times (for a single analyte standard) or one to four times (for a multi-analyte standard) the determined method detection limit and no higher than the reporting limit.

The sample shall then be processed through the selected method as if it were a field sample and evaluated against the standard acceptance criteria. Where more than one instrument or method is used, the LOD must be verified on each instrument or method. The LOD is considered verified if the apparent signal to noise ratio at the LOD is at least 3. For methods that do not produce a signal to noise ratio, the LOD result must be at least 3 standard deviations greater than the mean preparatory blank.

5.8.4 Quarterly Verification of the Limit of Quantitation (Analytical Chemistry)

A Limit of Quantitation (LOQ) sample shall be prepared by using a clean matrix, (deionized, distilled laboratory water for water samples and a purified solid matrix for soil or sediment samples), and a standard containing the analyte of concern. The LOQ sample shall be spiked at a concentration no more than one to two times the reporting limit. The LOQ should be set within the calibration range, including the lowest calibration level.

The sample shall then be processed through the selected method as if it were a field sample and evaluated against the standard acceptance criteria. Where more than one instrument or method is used, the LOQ must be verified on each instrument or method. The LOQ is considered acceptable if it meets the acceptance criteria defined in each method SOP.

5.8.5 Method Detection Limits (Analytical Chemistry)

A Method Detection Limit (MDL) will be established using accepted and published methodologies to determine the minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results. The MDL is established annually based on ongoing data collection.

5.8.6 Reporting Limits (Analytical Chemistry)

A reporting limit (RL) shall be established for each analytical method prior to implementation of the analysis on client samples. Reporting limits are the lowest value that can be reported while maintaining the ability to meet quality control criteria; it is a responsive value that is greater than that of the MDL, lowest calibration value, or lowest value required by the protocol or program.

5.8.7 Control Charts

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Control charts are quality control tools which graphically display QC parameters over time. See Figure 2 for an example of a control chart.

5.8.7.1 Accuracy Charts

For certain analytical programs, accuracy charts are maintained for LCS recovery. Each sample is identified by the date it was analyzed and its internal sample number. The true value (the expected value based on the amount spiked, with appropriate number of significant figures) is denoted as SA. The experimental value (the observed value, with appropriate number of significant figures) is denoted as SR and varies for each sample based on the recovery of the amount spiked. From these two values the Percent Recovery (%R) is calculated as:

$$\%R = (SR / SA) \times 100$$

Percent recovery is calculated differently for the MS sample where the concentration present in the original sample aliquot must also be factored in. In this calculation, SSR is the spiked sample detected, SR is the original sample detected, and SA is the amount of spike added. The percent recovery is calculated as:

$$\%R = [(SSR - SR) / SA] \times 100$$

The percent recovery is plotted onto a graph where the x-axis is the number of data points and the y-axis is the range of percent recoveries.

5.8.7.2 Precision Charts

Precision charts are maintained for duplicate analyses. Both samples are identified by the date(s) analyzed and their internal ID. "S" denotes the observed value (with an appropriate number of significant figures) for the original sample; "D" denotes the observed value for the duplicate (with an appropriate number of significant figures). The comparison of the two values is expressed as Relative Percent Difference (RPD), which is calculated to be an absolute value of values greater than or equal to zero. The RPD is calculated as:

$$RPD = \frac{S - D}{[(S + D) / 2]} \times 100$$

The RPD is plotted on the graph where the median, zero, represents 0% difference, the x-axis is the number of data points per chart, and the y-axis is the range of relative percent differences.

5.8.7.3 Suspicious and Out-of-Control Events

Plotting and connecting successive data points on control charts enables the laboratory to detect many types of suspicious and out-of-control events. These events can be noticed by monitoring the following: outliers, runs, trends, and periodicity.

5.8.7.3.1 Outliers

An outlier is defined as any particular point that falls outside the control limits, or any point that falls outside the warning limits. A point that

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falls outside the control limits is classified as an out-of-control event; a point that falls outside the warning limits is classified as a suspicious event.

5.8.7.3.2 Run

A run is defined as a series of points that line up on one side of the central line (the mean). Any run that has a length of seven points is indicative of a potential abnormality in the process, and a suspicious event. A run can suggest several potential problems such as a leak in the system, elevated contamination or incorrect dilutions of standards.

5.8.7.3.3 Trend

A trend is defined as a series of points that are marked by an unbroken rise or fall. Any trend with a length of five points is classified as a suspicious event. A trend may indicate a change in instrument sensitivity or standard degradation, etc.

5.8.7.3.4 Periodicity

Periodicity is a term used to describe a recurring pattern of change over equal intervals (i.e. a sine wave). This occurrence may be of any length or amplitude; thus careful observation of the control chart is necessary.

5.8.7.4 Limits

See Table 1 for the warning and control limits for laboratory control performance, analytical control performance, and reference toxicant performance.

5.8.7.4.1 Warning Limits

Upper and lower warning limits are established to aid in interpreting a suspicious or an out-of-control event, and are based on the most recent 20 data points for each method. Warning limits express a narrower confidence interval and are used to warn the analyst or supervisor of possible system inconsistencies or failures before an out-of-control event occurs. For analytical methods, ESI adopts warning limits as the mean ± 2 standard deviations or a 95% confidence. For bioassay testing, the warning limit is specified as the mean ± 1 standard deviation for laboratory controls.

5.8.7.4.2 Control Limits

Upper and lower control limits are established to aid in interpreting a suspicious or an out-of-control event, and are based on the most recent 20 data points for each method. Control limits express the outer limits of accepted method variability. Unless otherwise specified by the analytical method in use, ESI uses the 99% confidence interval as the control limits, which is defined as the mean ± 3 standard deviations. Where inter-laboratory expected ranges have been determined, ESI's goal is for control limits to fall within these multi-laboratory expected ranges for that method. For bioassay methods, the control limit is specified as the mean ± 2 standard deviations. A reference toxicant assay that falls between the ± 2

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and ± 3 standard deviation limits is considered to have fallen within the warning limits.

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Figure 5-1. Quality Systems Audit

QUALITY SYSTEMS AUDIT COVER SHEET and SCHEDULE				
		Scheduled	Completed	
		Date	Date	Initials
MANAGEMENT SYSTEMS				
4.1	Organization			
4.2	Management Systems			
4.3	Document Control			
4.4	Review of Request, Tenders and Contracts			
4.5	Subcontracting of Environmental Tests			
4.6	Purchasing Services and Supplies			
4.7	Service to the Client			
4.8	Complaints			
4.9	Control of Nonconforming Environmental Testing Work			
4.10	Corrective Action			
4.11	Preventive Action			
4.12	Control of Records			
4.13	Internal Audits			
4.14	Management Reviews			
4.15	Data Integrity Investigations			
4.16	Improvement			
TECHNICAL SYSTEMS REQUIREMENTS				
5.3	Facilities and Environmental Conditions			
5.4	Methods and Method Validation			
5.5	Calibration Requirements			
5.6	Measurement Traceability			
5.8	Handling Samples and Test Items			
5.9	Quality Assurance for Environmental Testing			
5.10	Reporting Results			

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Figure 5-2. Example of a Control Chart

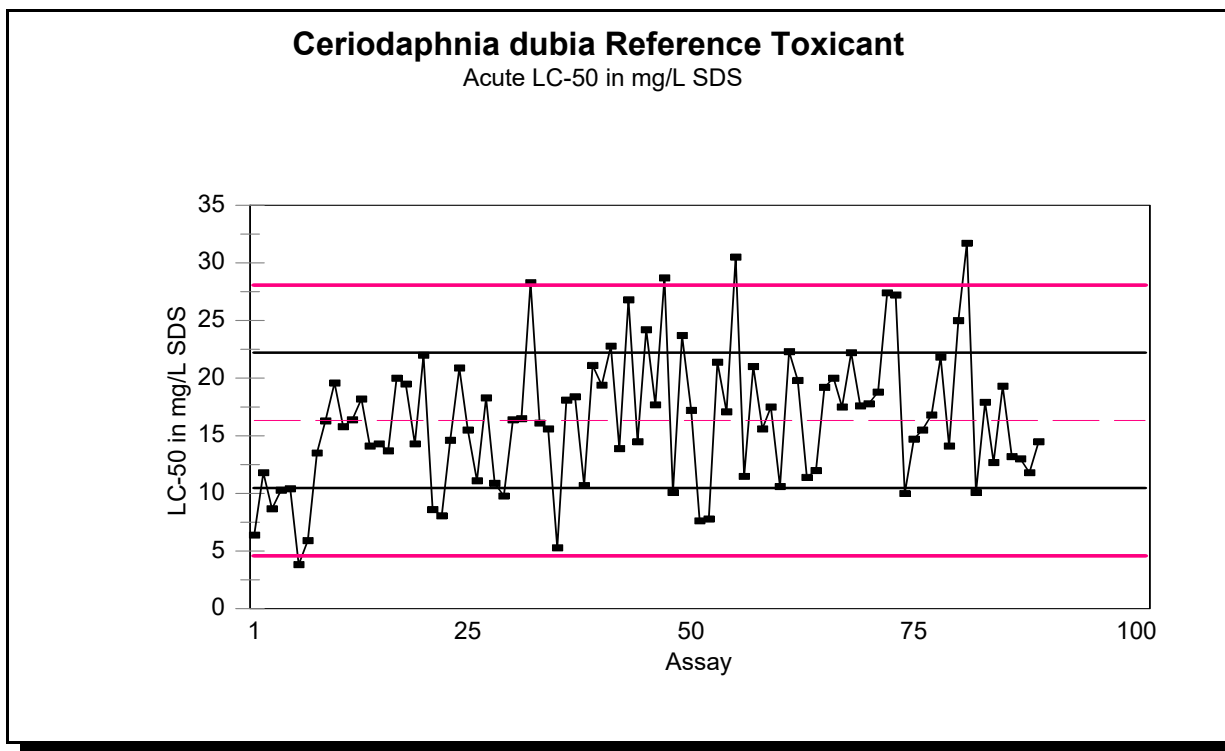


Table 5-1. Warning and Control Limits^a

Performance Type	Warning Limit	Control Limit
Lab Control Performance	± 1 Std	± 2 Std
Analytical Control Performance	± 2 Std	± 3 Std or method-specific
Reference Toxicant Performance	± 2 Std	± 3 Std

^a Std = Standard Deviations

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6.0 STANDARD OPERATING PROCEDURES and TEST METHODS

6.1 Standard Operating Procedures**6.1.1 Purpose and General Provisions**

Standard Operating Procedures (SOPs) are formal, revision-controlled documents that define the methods and standards employed by ESI. The purpose of every SOP is to provide a detailed set of instructions necessary to conduct a given procedure and assure that all laboratory staff can conduct all procedures correctly and in a uniform method. SOPs will include references to instructions, standards, manuals, and reference data where necessary.

6.1.2 Responsibilities

Personnel are responsible for performing tasks in accordance with applicable SOPs, except as explicitly directed by the relevant Quality Assurance Project Plan (QAPP), statement of work, or health and safety policy. Personnel, as appointed, are also responsible for assisting in designing accurate and practical SOPs, and reviewing and updating current SOPs. Personnel are also responsible for reading SOPs in a timely manner and documenting the reviews in their annual SOP review record. Supervisors are responsible for ensuring that analysts performing procedures have read the required SOPs and documented the review in their training file.

The Quality Assurance (QA) Manager is responsible for securing technical review of SOPs, determining the activities that require SOPs, and working with the appropriate and experienced technical personnel to develop SOPs. The Quality Assurance Unit (QAU) is responsible for ensuring annual review of technical SOPs and that all affected staff members are notified of any revisions. The QAU is responsible for maintaining an updated distribution list of SOPs, and securing approval of SOPs by the appropriate manager and QA Director before being put into practice and circulation. The QAU is also responsible for maintaining the original standards and reference documents, and for maintaining the complete set of SOP hard copies in the QA Office.

6.1.3 Contents of SOPs

Each SOP will contain the elements outlined in SOP QA-1100 "Preparation of SOPs" as mandated by TNI standards. All sections will be organized in a step-wise manner using numbered sections. Tables, diagrams, flowcharts, and validation data may be included anywhere in the SOP, but are typically found at the end of the document and will be referenced where needed. Equipment or instrument maintenance, and computer hardware and software will be added where necessary. Each SOP shall contain, at a minimum, the following information:

Cover Page

The standardized header will include the following information:

SOP Number: The internal document control number assigned and tracked by the QAU

Effective Date: Date SOP is approved by management

Revision Number: Chronology of revisions to the document

Page: All document pages will be paginated using a [page #] of [# total pages] format

Title: Name of the procedure described in the document

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The standardized title page will include the following information:

Approved By: Dated signatures of the QA Manager and appropriate manager

Revision History: A tabular listing of revisions to the document, including when and why the revision took place, and who was responsible for the revision

Section 1.0: Purpose and Applicability

- Identification of the test method
- Applicable matrix or matrices
- Scope and application of the method, including components to be analyzed
- Summary of the test method

Section 2.0: Definitions

This section should include a glossary of terms, expressions or acronyms introduced in the document, or commonly used during the procedure.

Section 3.0: Applicable Documents and References

- References

Section 4.0: Materials and Apparatus

- Equipment, hardware, software, and supplies
- Reagents and standards

Section 5.0: Methods and Procedures

- Sample collection, preservation, shipment and storage
- Calibration and standardization
- Procedure

Section 6.0: Quality Control Requirements

- Detection limits
- Interferences
- Quality control
- Data assessment and acceptance criteria for quality control measures

Section 7.0: Calculations and Reporting

- Calculations

This section should include a discussion of data analysis

Section 8.0: Corrective Actions

- Corrective actions for out-of-control data
- Contingencies for handling out-of-control or unacceptable data
- Troubleshooting and General/Routine Maintenance
- Method performance

Section 9.0: Health and Safety

- Safety
- Known hazards
- Waste management, when needed
- Pollution prevention, when needed

Section 10.0: Responsibilities

This section should include identification of the individuals (by title or organizational position) who are performing and facilitating the method governed by the SOP.

Section 11.0: Summary of Bioassay Test Conditions

This section should include a summary of critical testing conditions and acceptability criteria, as applicable to bioassay SOPs only.

Section 11.0: Waste Management and Pollution Prevention

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This section is an alternative Section 11.0, applicable to analytical SOPs. It addresses method-specific waste management and pollution prevention measures that must be considered and applied, in order to conduct the test method.

6.1.4 Development

SOPs are developed and issued as additional procedures and tests are developed. Additionally, client-specific SOPs or guidance documents traceable to standard SOPs may be generated in order to address the procedural needs of a particular project. Requests for new SOPs are made to the QAU. The QA Director will work with, or assign, experienced technical personnel to develop SOPs. Technical revisions and complete rewrites may necessitate training certification of personnel involved. The QAU will issue SOP numbers and coordinate word processing, review and approval. SOPs must be reviewed and accepted with a dated signature on the cover page by two approved signatories denoted as the "QA Manager" and "Manager". Note that the signatories on the cover page of SOPs are general titles, as "manager" shall be the appropriate manager.

6.1.5 Numbering

Each SOP is assigned a unique four digit number from the SOP Numerical Index, maintained by the QAU. This number is part of the document control number when the SOP is accepted for implementation by management.

6.1.6 Reviews and Revisions

The purpose of SOP reviews is to ensure continued suitability. In order to ensure that SOPs reflect current protocols and laboratory conditions, technical SOPs shall be reviewed on an annual basis, at minimum. If no changes are made, then no change in the revision number is required. The electronic SOP Review Tracker Spreadsheet must be updated to document the review, and the SOP Tracker Form documenting the review will be filed with the current SOP revision.

An SOP revision may be necessitated by regulatory requirements, technological advancements or protocol updates. If changes are required to existing SOPs, then the changes will be initiated by the preparation of a revised SOP draft. The draft file will be named with the next revision number and year of revision, and saved in the "SOPs Under Revision or in Development" electronic folder until approved.

The new revision number, effective date, initials of the person making the revisions, and summary of the revision will be recorded in tabular form in the revision history table on the SOP cover page. The revision process is detailed on an SOP Tracking Form (Figure 6-1), which is generated for each SOP revised.

Acceptance of the revised draft by management is signified by dated signatures on the cover page of the SOP and the date on the SOP tracking form. If the document only requires minor changes or additions, then the revisions will be reviewed by at least one additional staff member (typically 2) other than the SOP signatories. The revision number and nature of the revision will be appended to the document's revision history. If a major revision is required, an experienced staff member may be assigned to rewrite the SOP. The amended document will be required to undergo a full review and approval by management.

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Once formally approved, an electronic comparison document, generated by comparing the outdated version to the current version, will be stored in the appropriate subdirectory. The comparison document will identify differences between the two document versions. Comparison documents will be available for review by all staff members on the P drive under working SOPs so that changes in SOPs can be noted. When changes in word processing software make generation of comparison documents impossible, SOP tracking forms will detail changes made from one revision to the next and will be available to all staff for review. The outdated electronic version should be moved from the active directory to the appropriate archive subdirectory. The revised SOP will be moved from the revisions directory to the active directory and password protected to prevent unauthorized access. The SOP Sectional-Index will be updated with the revision number and date, and the SOP Review Tracking Log will be updated. A hard copy of the revised SOP with signatures, revision tracking form, and comparison report will be filed. An electronic and controlled PDF version of the SOP will be password secured and made available for general access. All affected staff will be notified.

6.1.7 Organization and Distribution

Master electronic versions of SOPs will be organized in classified folders on the network and password secured. SOPs are organized into the following categories:

- | | |
|--|------------------------|
| - Introductory SOPs | -Eco Risk Testing SOPs |
| - Analytical SOPs | Soil Assays |
| General Information SOPs | Plant Assays |
| Inorganic SOPs | Animal Assays |
| Sample Prep SOPs | Sediment Assays |
| Wet Chemistry SOPs | Freshwater Sediment |
| - Client Specific SOPs | Acute Assays |
| - Computer System SOPs | Chronic Assays |
| - Data Reviewing and Reporting SOPs | Marine Sediment |
| - Eco Risk Support SOPs | Acute Assays |
| - Effluent Toxicity Testing Acute SOPs | Chronic Assays |
| - Effluent Toxicity Testing Chronic SOPs | Water Column Assays |
| - General Laboratory SOPs | Marine Assays |
| -General Toxicity Testing SOPs | Freshwater Assays |
| - Microbiology SOPs | Acute Assays |
| - Organism Culture and Maintenance SOPs | -QA-QC SOPs |

The most recently approved version will be placed in an electronic folder as a PDF document for general access. The folder can be located on the network in the "WORKING SOPS" folder. SOPs located in the working SOP folder will include a watermark that states: "INTERNAL DOCUMENT - NOT FOR GENERAL DISTRIBUTION".

Copies of SOPs provided to existing clients or regulatory bodies will be identified as being limited in use to a specific project. They will be labeled as property of EnviroSystems, an Affiliate of Enthalpy Analytical and contain the following statement: "This document is the property of EnviroSystems, Inc. (or Enthalpy Analytical, LLC). All information contained herein is confidential. No parts may be used or distributed without permission of EnviroSystems, Inc. (or Enthalpy Analytical, LLC)." Every effort will be made to provide clients and regulators with the most current possible revision.

In the event that a prospective client requests a copy of an SOP, it may be labeled
This document is the property of Enthalpy Analytical, LLC. All information contained herein is confidential.
No parts may be used or distributed without permission of Enthalpy Analytical, LLC.

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for review purposes only by containing a header specifying that the document is an "UNCONTROLLED DOCUMENT". This header indicates that they are for review purposes only and may not reflect the most current policies or practices. Copies of SOPs sent to clients may or may not contain authorization signatures. Unless otherwise specified, SOPs will be provided to clients and other requesting agencies in Adobe Acrobat® PDF format. All files provided will be password secured documents. Security measures assigned to a document will, at a minimum, prohibit modification or editing of the material. Additional security measures that prohibit printing of the document may be applied to documents that are not provided directly to a client as part of a project work scope document.

6.1.8 Archive

An archive of all the hard copy SOPs is maintained by the QAU in the QA Office. The hard copy archive contains the most current revision of each document, as well as the original copy of superceded versions. The original hard copy of the document will be retained for a period of five (5) years. Electronic copies of the documents in PDF format will be maintained for a minimum of ten (10) years. For more information on SOP record management see Section 11.1 of this Quality Assurance Manual.

6.2 Test Methods

Test method manuals will be the most current approved edition available for each specific manual, unless otherwise specified by the client. Methods used will be developed by the EPA, ASTM, APHA and other groups. Copies of these documents will be maintained at the laboratory. The primary test methods used and their most recent editions are listed in the SOPs under Section 3.0: Applicable Documents and References. A list of technical SOPs that include associated test methods can be found in a spreadsheet on the Quality Assurance drive (Q drive) in the QC spreadsheets folder.

6.3 Incorporation of New Test Methods

Prior to the laboratory providing a new service or specific test method, a review of the protocol is conducted by the Laboratory Director and Technical Manager to ensure that the laboratory has all necessary equipment and appropriate facilities to successfully conduct the method before a SOP is developed. If the laboratory develops new methods for the analysis of samples, then they may only be used if the methods are appropriate to the sample matrix, analytes of concern, and the client's needs. Additionally, no new or substantially modified method may be used until it has been validated and staff have been trained. Validation is as extensive as necessary and the laboratory shall maintain all records of procedures, training, and validation.

6.4 Current Procedures and Testing Services

Table 6-1 provides a current listing of procedures conducted by the laboratory. The list is developed from the SOP Sectional-Index, which serves as a master list and identifies the current revision of SOPs.

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Table 6-1. List of Standard Operating Procedures

INTRODUCTORY SOPs

- 1102 Use, Calibration and Maintenance of Laboratory Equipment
- 1103 Record Keeping
- 1105 ESI NPDES Permit Monitoring Plan and Requirements
- 1106 Security and Data Storage
- 1107 Hazard Communication and Safety
- 1108 Training
- 1113 Cleaning and Maintenance of General Laboratory Glassware
- 1124 Calibration and Use of Balances
- 1125 Ethics and Data Integrity
- 1131 Sample Handling and Electronic Login
- 1134 Corrective Action Report System

GENERAL TOXICITY SOPs

- 1101 Procurement and Acclimation of Organisms For Use in Toxicity Tests
- 1104 Dilution Water for Toxicity Tests
- 1114 Conduct of Reference Toxicant Assays
- 1127 pH Adjustment of Effluent and Receiving Water Samples for NPDES Testing
- 1200 Synthetic Water Preparation
- 1400 Sample Dechlorination and Sodium Thiosulfate Control
- 1484 Use of Water Delivery Trays in Assays

EFFLUENT TOXICITY TESTING ACUTE SOPs

- 1313 Determination of Loading Rate
- 1401 Acute Toxicity of Effluents to the Tidewater Silverside Minnow, *Menidia beryllina*
- 1403 Acute Toxicity of Effluents to the Mysid, *Americamysis bahia*
- 1404 Acute Toxicity of Effluents to the Fathead Minnow, *Pimephales promelas*
- 1405 Acute Toxicity of Effluents to the Daphnid, *Ceriodaphnia dubia* or *Daphnia pulex*
- 1422 Acute Toxicity of Effluents to Trout

EFFLUENT TOXICITY TESTING CHRONIC SOPs

- 1408 Chronic Toxicity of Effluents and Waters to the Daphnid, *Ceriodaphnia dubia*
- 1409 Chronic Toxicity of Effluents and Waters to the Minnow, *Pimephales promelas*
- 1411 Chronic and Modified Acute Toxicity of Effluents to the Mysid Shrimp, *Americamysis bahia*
- 1412 Chronic Toxicity and Sperm Immobilization of Effluents and Surface Waters to *Arbacia punctulata*
- 1413 Chronic Toxicity of Effluents to the Tidewater Silverside Minnow, *Menidia beryllina*
- 1423 Chronic Toxicity of Effluents and Surface Waters to Trout Conducted in the State of Maine

MICROBIOLOGY SOPs

- 1110 Microbiology QA-QC
- 1314 Coliform Bacteria Sample Collection
- 1340 Heterotrophic Plate Count for Quanti-Tray
- 1497 IDEXX ENTEROLERT® Test Method for the Detection and Enumeration of Enterococci in Water
- 1496 IDEXX COLILERT®-18 Test and QUANTI-TRAY® Method for the Detection and Enumeration of Fecal Coliforms in Wastewater

ECO RISK SUPPORT SOPs

- 1321 Determination of Organic Content in Soil by Loss on Ignition
- 1330 Preparation of Suspended Particulate Phase (SPP) and Elutriate Solutions for Marine Sediment Evaluations
- 1332 Percent Moisture in Solid Samples
- 1339 Collection of Sediment Pore Water Samples
- 1342 Preparation of Elutriate Solutions for Sediment Evaluations Using the Modified Approach
- 1373 Pore Water Salinity Adjustment
- 1478 Compositing of Sediment Samples
- 1491 Elutriate Preparation; Marine

ECO RISK TESTING SOPs

Sediment Assays - Freshwater Sediments - Acute Exposure Assays

- 1406 Acute Toxicity of Sediments to the Amphipod, *Hyalella azteca*
- 1407 Acute Toxicity of Sediments to Midge Larvae, *Chironomus dilutus*
- 1482 Amphibian 10 Day Acute Exposure Sediment Assay

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Page: 7 of 9**Sediment Assays - Freshwater Sediments - Chronic Exposure Assays**

- 1432 Assessment of Bioaccumulative Potential to the Freshwater Minnow, *Pimephales promelas*
- 1445 Assessment of Bioaccumulative Potential of Sediments to the Freshwater Oligochaete, *Lumbriculus variegatus*
- 1464 Chronic Toxicity of Sediments to Midge Larvae, *Chironomus dilutus* Based on Life Cycle
- 1466 Assessment Toxicity (42-Day) of Sediments To The Amphipod, *Hyalella azteca* Based on Survival and Growth
- 1467 Assessment Toxicity (28-Day) of Sediments to the Amphipod, *Hyalella azteca* Based on Survival and Growth
- 1470 Chronic Toxicity of Sediments To Midge Larvae, *Chironomus dilutus*, Based on Emergence
- 1475 Toxicity of Sediments To Midge Larvae, *Chironomus dilutus* based on 20-day Exposure Evaluation
- 1476 Chronic Exposure Toxicity of Sediments to the Fathead Minnow, *Pimephales promelas*

Marine Sediments - Acute Exposure Assays

- 1426 Acute Toxicity of Sediments to the Marine Amphipod, *Ampelisca abdita*
- 1446 Acute Toxicity of Sediments to the Marine Amphipod, *Leptocheirus plumulosus*
- 1471 Acute Toxicity of Sediments to the Mysid Shrimp, *Americamysis bahia*

Marine Sediments - Chronic Exposure Assays

- 1435 Marine Sediment Bioaccumulation Evaluation with the Polychaete, *Nereis virens*
- 1448 Chronic Toxicity of Sediments to the Amphipod, *Leptocheirus plumulosus*
- 1469 Marine Sediment Bioaccumulation Evaluation With the Bivalve Clam, *Macoma nasuta*
- 1473 Chronic Toxicity of Sediments to the Polychaete, *Neanthes arenaceodentata*

Soil Assays - Animal Assays

- 1410 Acute Toxicity of Sediments to the Earthworm, *Eisenia fetida*
- 1447 Earthworm, *Eisenia fetida*, Bioaccumulation Evaluation
- 1468 Earthworm, *Eisenia fetida*, 28-Day Survival Assay

Soil Assays - Plant Assays

- 1449 28 Day Early Seed Germination and Growth Evaluation

Water Column Assays - Freshwater Assays - Acute Exposure Assays

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- 1459 Acute Toxicity of Dredged Material Elutriate to the Fathead Minnow, *Pimephales promelas* - Great Lakes Protocol

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- 1112 Determination of Precision, Accuracy and General Acceptance Criteria
- 1132 Manual Chromatographic Peak Integration
- 1147 Analysis of LOD and LOQ Quality Control Samples
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- 1324 Preparation of Glassware for Trace Metals Analysis
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- 1309 Computation of Hardness by Calculation Method
- 1310 Total Dissolved Solids Dried at 180±2°C
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- 1328 Preparation of Ammonia Samples by Distillation
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- 1346 Biochemical Oxygen Demand (BOD) and Carbonaceous Biochemical Oxygen Demand (CBOD)
- 1347 Chemical Oxygen Demand by Closed Reflux
- 1352 Analysis Total Kjeldahl Nitrogen in Water and Biosolids by Digestion and Distillation
- 1354 Total Cyanide
- 1356 Nitrate - Nitrite by Lachat FIA
- 1357 Sulfide (Colormetric, Methylene Blue)
- 1359 Chloride Analysis by Titration
- 1361 Total Organic Carbon in Soil and Sediment by Walkley-Black Wet Oxidation
- 1393 Analysis of Anions by Ion Chromatography
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- 1116 Preparation and Use of Control Charts
- 1119 Data Review and Reporting

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1122 Data Transmission
 1320 Statistical Analysis of Acute and Chronic Exposure Bioassay Data

Figur 6-1. SOP Tracking Form

SOP Tracking Form

The purpose of this form is to document the review of SOPs, and to ensure newly developed or revised SOPs include all the complementary tasks necessary for implementation.

Drafted SOP: QA- _____ R- _____

Proposed SOP Name: _____

Current SOP: QA- _____ R- _____

SOP Name: _____

Date of Review: _____ Reviewer's Initials: _____ Revision Required? **Yes / No**

If no revision is required, please add any additional comments in the comment section below and file this form with the hard copy SOP revision in the QA Office.

If Revision Required,
 Reason for Update: _____

Task	Initials	Date	Comments
<input type="checkbox"/> Revised / Drafted:			
<input type="checkbox"/> Reviewed:			
<input type="checkbox"/> Reviewed:			
<input type="checkbox"/> Reviewed:			
<input type="checkbox"/> Reviewed:			
<input type="checkbox"/> Reviewed:			
<input type="checkbox"/> Compare Document Prepared and Filed:			
<input type="checkbox"/> Digital Copy Moved From Revision Folder to Electronic Folder:			
<input type="checkbox"/> SOP Review Tracking Spreadsheet Updated:			
<input type="checkbox"/> SOP Sectional-Index updated:			
<input type="checkbox"/> Affected Staff Notified:			
<input type="checkbox"/> Hard Copy Placed in File Cabinet:			

Revisions that alter the name of the SOP and newly created SOPs will necessitate updates to the SOP Review List and the SOP Numerical Index. These document do not contain revision numbers; therefore, changes in revision do not require updates.

New Designation: QA- _____ R- _____ **Effective Date:** _____

Comments: _____

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7.0 SAMPLE HANDLING, ACCEPTANCE, RECEIPT AND IDENTIFICATION**7.1 Sampling Kits**

Based upon the specific request, appropriate containers for the necessary volumes and quantities of sample(s) are prepared for shipment to the client. In general, sampling kits contain the following:

- Chain of custody forms
- Custody seals
- Packing material
- Preservative
- Sample container(s)
- Sample labels
- Shipping container(s)
- Temperature blank(s)

7.1.1 Sample Containers

Sample containers provided by the laboratory are made of Teflon, virgin polyethylene or glass, and are provided by reputable vendors (such as QEC). Containers are of suitable size and quality as to not cause contamination to or reaction with samples. Sample containers are selected to meet project-specific or program-specific data quality objectives, including: minimum reporting limits, sample volume and field durability. As such, selected containers should not require pre-cleaning or any other modifications. Suitability of any new or current source of containers may be verified through initial and ongoing analysis of laboratory bottle blanks and field reagent water blanks.

Project-specific quality assurance plans may require special pre-cleaning, serial-numbering, or sample container chain of custody documentation. These will be provided upon request and at additional cost.

7.1.2 Assembly of Sample Kits

Sampling kits generated are based on the needs of the client. Temperature blanks are always provided. Typically, chains of custody and bottle labels (blank or pre-populated with project specific information) are provided. Chains of custody are always placed in a zipper sealed plastic bag to minimize damage during shipping. If blank, bottle labels are also placed in this bag. Pre-populated labels may be adhered to their corresponding bottles prior to shipment. The appropriate number and type of containers are then placed in a cooler of appropriate size for transport. Glass containers are surrounded with packing material to minimize damage during shipping. If necessary, appropriate preservatives are provided and accompanied by guidance documents describing their usage.

Sample kits are delivered to the client via commercial shipping service (UPS, FedEx, etc.) or by laboratory staff, or may be picked up by the client.

7.2 Sample Acceptance Policy

At the time of sample receipt, all samples are to be inspected to ensure that they meet minimum protocol and method requirements. This shall include, but not be limited to, the following:

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Presence of chain of custody (COC)
All pertinent sections of COC are complete and document is signed
Custody seals present and intact
Samples are properly labeled
Samples are in acceptable condition (intact, proper container and preservative)
Sample volume is sufficient
Samples received within holding time

The above information shall be entered on the Sample Receipt and Condition Document (see Section 7.4). A copy of this document will be included in the final report. If samples received do not meet the laboratory's sample receipt policies, the sample is retained and every attempt is made to resolve the discrepancy. Minor discrepancies may be resolved by contacting the client and noting the deviation and corrective actions. Sample temperature deviations, incomplete COC records, and incorrect sample preservation may be resolved through these means. In these cases, the discrepancy does not immediately threaten the integrity of the sample, and testing will usually continue unless otherwise directed by the client. In situations where the discrepancy jeopardizes the integrity of the sample, the client will be contacted immediately and testing will be temporarily suspended until an appropriate course of action is determined. In cases where a sample appears not to meet program criteria, the client will be notified and consulted on how to proceed. If the client elects to have the samples analyzed, then data will be reported with the appropriate qualifiers. In cases where the client indicates that they do not wish to have samples analyzed, the laboratory will make the appropriate notations and handle them as specified by the client. All communication with the client will be documented.

7.3 Chain of Custody

The National Enforcement Investigations Center (NEIC) of EPA defines custody of evidence in the following manner:

It is in your actual possession, or
It is in your view, after being in your physical possession, or
It was in your possession and then you locked or sealed it to prevent tampering, or
It is in a secure area

Field personnel or client representatives must complete the chain of custody form(s) and samples received by the laboratory must be accompanied by this form(s). The chain of custody may be the means by which the courts, in some types of legal proceedings, require proof of custody of samples from time of receipt to completion of analysis. (See Figure 7-1 for an example chain of custody.) Samples may be physical evidence for litigation and should be handled according to certain procedural safeguards.

The chain of custody should contain the following information:

Analysis requested
Client project name
Condition of the sample, if it is not acceptable
Container size and type
Date / time sampled, sampled by and sample type
Date / time samples received
Date / time samples relinquished
Deviations from standard sampling technique

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Field sample identification (Field ID)

Matrix

Preservative (if present)

Sampler initials

Signature of those that physically handled the samples (e.g., relinquishing and receiving), with organization and address

Special remarks concerning the sample condition

The record is filled out completely and legibly in indelible ink. Correction of errors is made by drawing a single line through the error and entering initials and date with the appropriate error code. The correct information is then recorded with indelible ink. All transfers of sample must be recorded on the chain of custody via the "relinquished" and "received by" sections. All information except signatures may be printed.

All samples received are verified against the information provided on the chain of custody. Any sample discrepancies are recorded and the client is notified. This information must be documented on the sample receipt record. The study number is recorded on the chain of custody and Lab ID Numbers are assigned to the samples listed.

The chain of custody shall be inspected to ensure that the samples and analyses requested by the client meet the anticipated project requirements specified in the scope of work, quotation, or other project specific documentation. The laboratory will ensure that the information on the chain of custody regarding sample volume, sample container type, sampling, and collection time are appropriate to the requested analysis and analytical methods. If there is a discrepancy between any of these documents, the client shall be notified and a determination is made as to how to handle the samples outside the planned scope of services. If sample parameters requested by the client are not covered by the laboratory's accreditation, then the client will be notified and arrangements may be made to subcontract the analysis to a laboratory that has the necessary accreditations. Communication with the client will be documented.

Analytical methods used for the analysis of samples shall be appropriate to the sample matrix and responsive to the client's specified needs. If a client has specified an analytical method on the chain of custody, then the method shall be used unless it is inappropriate. If the method is inappropriate, then the client will be notified and options will be provided to the client.

After sample log-in, the chain of custody record and all sample receipt documentation will be maintained with the study file. If necessary, an internal custody record may be generated to track the transport and status of each sample within the laboratory. Further details on internal laboratory custody procedures are provided in subsequent subsections.

7.4 Sample Receipt Records

The following information will be documented on the sample receipt record: completeness of the chain of custody; sample condition; sample temperature at receipt, presence of intact custody seals (if applicable), date and time of receipt, condition of sample if not acceptable, and initials of person receiving and logging in samples. The sample receipt record will remain with the project documents and a copy will be included in the final report. If samples have been received and are not in proper condition, then clearly document the status of the impacted samples. A manager should then be notified and, based on professional judgement, corrective actions should be initiated. Minor issues, such as the loss of one aliquot in a set, may not require much action, whereas loss of sample integrity would require new collection.

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Sample receipt records for chronic bioassays that use renewal water samples follow a specialized format (Figure 7-2). All other samples will use an electronic sample receipt record (Figure 7-3). This form will be generated using a template found on the server during the sample electronic login procedure.

7.5 Sample Receipt and Processing

Typically, samples are received by the laboratory during normal business hours (8:00 AM to 4:30 PM), Monday through Friday and 8:00 AM to 12:00 PM on Saturday. Shipments for after-hours and Sunday delivery are prearranged with laboratory to ensure that personnel will be available to sign the chains of custody, record the date and time of sample receipt, and place the cooler in the sample management area under refrigeration until the next business day.

Shipping containers should be opened under a hood or in a well ventilated area. Upon sample receipt, sample shipping containers are inspected for general condition and the presence of custody seals. If custody seals are present on the sample shipping container, they are removed from the container, taped onto blank paper, and placed with the project documents. If there are air bills present, they are also taped onto blank paper and placed with the project documents. If notes and memos are provided by the client with samples, they will be maintained with the project files and copies will be included in the final report.

The sample receipt temperature (ideally from a temperature blank) will be recorded. All samples that require thermal preservation shall be considered acceptable if the arrival temperature is within 2°C of either the required temperature or the method specified range. For samples with a specified temperature of 4°C, a temperature ranging from just above the freezing temperature of water to 6°C shall be acceptable. Samples that are delivered to the laboratory on the same day that they are collected may not meet these criteria. In these cases, the samples shall be considered acceptable if there is evidence that the chilling process has begun, such as arrival on ice. Receipt and refrigeration of un-chilled samples within 15 minutes of collection is also acceptable. If a temperature blank is not available, other temperature measurement procedures may be used, such as the use of an IR gun to monitor the surface temperature of a sample.

The receipt temperature is recorded on the sample receipt record. If there are multiple shipping containers, the temperature for each shipping container should be noted. Be aware that if a temperature blank is removed from a cooler to be measured, the temperature will be impacted by the ambient conditions and should be recorded immediately.

7.5.1 Sample Identification

Once samples are accepted into the laboratory they are assigned a laboratory identification number (Lab ID Number), logged into the Laboratory Information Maintenance System (LIMS) and stored in an appropriate designated sample storage area. An internal custody record or notation may be generated to track the transport and status of each sample and its daughter samples, as applicable, from receipt to disposal within the laboratory.

The Lab ID Number must be recorded on the container with indelible ink. When multiple containers are received for the same analysis, an additional numerical identifier is written on each container replicate. The identifiers always start with "1" and increase by one for each container. Both the identifier and total number of sample containers are recorded on each container in "# of total #" format.

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Additionally, cubitainers are labeled with a sample type identifier. The letter "E" is used for all effluents, the letter "D" is used for all receiving waters. The renewal number is identified with "0" for the start sample, "1" for the first renewal, and "2" for the second renewal. For example, the start effluent sample would be labeled as "E0".

7.5.2 Internal Chain of Custody

Upon client request, it may be necessary to generate more specific sample custody information so that every sample storage, transfer and usage transaction is documented. Samples that necessitate this information require a Sample Storage / Usage Log (Figure 7-4). Essential information for the storage and usage sheet include: study number; client name; storage location; sample identification; date, time and initials of staff members removing and returning sample; reason for removal and approximate volumes removed. Completed sheets are included in the data package.

7.5.3 Sample Preservation and Holding

Samples are routed and stored in appropriate areas of the laboratory based on sample preservation requirements. Chemical preservation must be checked at the time of sample receipt for all samples, unless it is not technically acceptable to do so. The procedure for checking pH shall be one that minimizes the potential for impacting the integrity of the sample. Several techniques are available for this procedure and may include pouring off a minimal volume into a sub-sample container where pH is then measured, or dipping a clean glass rod into the sample and then applying the rod to a pH test strip. Chemical preservation is matrix-specific and the chain of custody should be consulted when checking preservation. If the matrix is not specified, the client will be contacted and the discussion recorded. If continued preservation of the sample is in doubt or deterioration of the preservation is suspected, then the chemical preservation should be rechecked. The internal parameter list should be consulted if the correct preservation is unknown (L:\DATA2\LOGIN\paramlst). Samples that have their pH verified or require adjustment need to be recorded in the Preservation Logbook or on the sample receipt record.

If a sample for metals analysis arrives unpreserved, then the sample must be preserved upon receipt. The preservation is recorded and the bottle needs to be flagged to alert the analyst. Apply a label to the cap with the preservation date and time. The method specifies that samples are held 24 hours after preservation and prior to analysis. At the request of the client, the sample may be analyzed without the 24-hour holding period; such data will be appropriately qualified. Any discussion with the client will be recorded.

7.5.4 Billing Reports

A billing report is filed when samples are received for bioassay, chemistry or microbiological studies. A copy of the chain of custody is stapled to the completed billing report form and placed in the accounts payable inbox. A billing report form is not filed for ecological risk studies.

7.5.5 Immediate Analysis

Some parameters have short holding times and require immediate analysis, which is defined as less than 48 hours from sampling time. The parameter list (see Section 7.5.3)

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should be consulted if the holding time is unknown for an analysis. If a sample requires immediate analysis, then the appropriate staff members need to be notified.

7.5.6 Sub-samples

If an aliquot must be sub-sampled for analysis, it is assigned a new Lab ID Number. Sub-samples are entered into the electronic login database table with the same Field ID, date and time sampled as the parent sample. The date and time that the sub-sample was taken should be recorded as the date and time received in the electronic login table.

There may be times when a sample will need to be sub-sampled for multiple analyses. In such a case, the analysis requested code would be filled in as "Subsample: test A, test B, test C;".

7.5.7 Altered and Composite Sample Login

ESI occasionally receives samples for analysis that require alteration of their original state prior to specific analyses being performed on them. If a sample is altered from its original state, then the result becomes its own new sample. This new altered sample is given a new Lab ID Number and Field ID, and the date and time altered become the sampling date and time.

A composited sample is a type of altered sample. When a sample is received for compositing, it is logged into the electronic login database table with the Analysis Requested: "Composite: new Field ID". The composited sample is then logged into the laboratory as a new sample with a unique Lab ID Number, new Field ID, and Analysis Requested information. Compositing Form(s) must be filled out for sample tracking purposes. The completed Compositing Forms are retained in the project file.

7.5.8 Electronic Login

Data for each sample is entered into an electronic login database table after the sample has been deemed acceptable and the proper information has been recorded on previously mentioned records (i.e. sample receipt record, sample preservation, billing report). Samples can be logged into the electronic data system by appending the login table or by using a login template. On the primary template page, the button titled "Sample Receipt and Login" is where the template can be accessed. The template acts as a prompt and helps one fill in the necessary information for sample login.

During the login process a study specific joblogin file is generated. The file will be contained in a folder with the Study Number as its name. If corrections to the joblogin file or sample receipt record need to be made, this is where they are saved.

The login table has multiple records (rows). Each record (row) has fixed fields (columns, listed below). The first record in the table has in each of its fields a fixed "field name". There is a subsequent record (row) for each unique sample. It contains the following information: lab ID, field ID, matrix, analyses requested, sampled date and time, customer code, project name, analysis protocol, received date and time, container type, preservation, initials of the individuals receiving and logging samples, and a comment field.

7.6 Initiation of Testing Program

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In the toxicology laboratory, once samples are received and logged into the laboratory system, sample studies are tracked by the daily work list. A work list is generated for every day and includes information such as: current in-life studies, daily quality control tasks, and maintenance tasks. Staff members mark off and initial items on the work list as they are completed. Original daily work lists are maintained by the laboratory for a minimum of one year, and digital copies for a minimum of ten years. Analytical laboratory work lists are generated using the LIMS and are generated as necessary.

7.7 Sample Storage

Samples are stored in areas with limited access or under locked conditions. Samples requiring secure storage or reference samples being retained for archival purposes are stored under locked conditions, and may require the use of a Sample Storage / Usage sheet (Figure 7-4). Samples will be stored in such a manner as they do not and are not contaminated by other samples. Samples will not be stored with reagents and standards. Sample extracts will be stored in a separate location from samples.

7.8 Sample Disposal

Unused portions of samples are disposed of, following all state and federal regulations, only after completion of sample analysis, submission of the final report and contracted sample retention times have been achieved. All conditions of disposal, and all records and correspondence concerning the final disposition of the physical sample, shall be recorded and retained. Records shall indicate the date of disposal, the nature of the disposal, and the name of the individual who performed the task. Labels on all sample containers will be removed or defaced.

Samples that are considered hazardous waste are handled by state and federally licensed hazardous waste disposal firms. Storage of all waste samples and associated waste materials will follow applicable rules and regulations. Hazardous waste material held in the storage shed will be inspected weekly, not to exceed 7 days. This helps ensure container integrity, accessibility and compliance with state and federal laws. Inspections will be documented by a Hazardous Waste Coordinator. Any hazardous waste storage containers filled with liquid materials are placed on spill pallets capable of holding 110% of each container's maximum quantity. A list of emergency contact persons with day and home telephone numbers is posted in the storage shed.

7.8.1 Aqueous Samples

After testing, aqueous samples will be disposed of through the laboratory's aqueous waste UV treatment system. This includes all unused samples, diluted samples, and dilution waters that are not preserved. Access points for aqueous waste disposal in compliance with state and federal regulations are located throughout the laboratory and include streams for acidified samples, alkaline samples, and unpreserved samples. Any samples found to be toxic may require further testing or treatment in order to determine proper disposal technique to assure compliance with all local, state and federal regulations.

7.8.2 Solid Materials

Waste storage, transfer and disposal will be in compliance with NH DES and US EPA waste disposal regulations. Non-hazardous solid materials, sediments, and soils will be disposed of through an appropriate waste disposal site. All non-hazardous solid waste will be drained of as much free liquid as possible. The remaining sample will be removed from

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its original container and placed with other non-hazardous waste samples in a 55 gallon metal drum. Once full, these containers will then be transferred to an approved waste disposal facility. This transfer is recorded on a waste manifest and they are retained for a minimum of 3 years.

7.8.3 Chemically Preserved Samples

Chemically preserved samples should have a pH of <2 or >12 SU. The pH alone causes them to express a corrosively hazardous nature that must be neutralized prior to disposal. Once neutralized, samples are no longer viable for testing and are then considered waste. Samples may be discharged with compatible streams and in compliance with all federal and state regulations. If any samples are hazardous for reasons other than pH, then they must be disposed of according to their specific requirements based on hazard classification. The approximate volume of neutralized waste, date of disposal and initials of person performing the disposal are recorded in a logbook.

7.8.4 Hazardous Waste Samples

Hazardous waste samples must be handled by properly trained employees. Only the hazardous waste coordinator may train employees on handling hazardous waste. There are 3 main hazardous waste streams: "dilute metals acidic", "solvents", and "Lachat wastes". When a satellite container needs to be emptied, it is properly transported to the waste shed and added into the appropriately labeled container for that waste stream. Logbooks are kept as a record for volumes added to each drum of any specific waste stream, and shipping manifests reflect when they are picked up for transport.

7.9 Subcontracting Analytical Services

Every effort is made to perform analyses within the laboratory; however, there are instances where subcontracting of analytical services is necessary. The laboratory is responsible for the subcontractor's work, except where the client specifies the subcontractor. All subcontractors must adhere to ISO 17025 requirements. For a list of approved subcontractors, refer to the "Subcontractor & Vendor List" on the Sales drive.

Subcontracting a testing service will not be done without approval from the client. Approval may include an email notification outlining the required use of a subcontractor, with a record of communications between ESI and the client included in the project file. Whenever possible, a NELAP or DoD accredited laboratory will be chosen to accompany the analytical service request and, at the very least, must be a competent subcontractor. Laboratories that are subcontracted by ESI to conduct compliance testing for samples originating from Massachusetts, Connecticut, Rhode Island, and Maine must have the proper accreditations from these states. Records of compliance must be provided by the subcontractor for the sake of ensuring departmental certification. In order to be compliant with DoD requirements, subcontract laboratories must be DoD accredited and have project-specific written approval prior to sample analysis. If no such laboratory exists, the client will be notified. If the client approves the use of a non-accredited laboratory, such reports will be clearly identified as being from a non-approved laboratory.

When a sample that must be subcontracted arrives, it is received like any other sample, it is billed, assigned a Lab ID Number, and logged into the electronic login database table. Sample details and required notifications are documented in the subcontractor log. A chain of

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custody is filled out for subcontracted samples before they are transported to the subcontractor. The ESI Study number is entered as the project name, and the Lab ID number is entered as the Field ID. There should be no reference to the client's identification, project name, or location on the chain of custody, unless specifically requested by the client. Any client identifying information that exists on the sample bottle should be blacked out before being sent. A copy of the chain of custody is placed in the project file. The original chain of custody will remain with the samples.

All subcontracted sample data reports are sent to management for review before being reported to the client. The subcontract laboratory will be clearly identified in the final report to the client. For compliance work, a copy of the laboratory's state certification will be attached to the final report. This will allow the client to identify the accreditations held by the subcontractor and will allow the client to reference the laboratory's program identification number if need be. A copy of the subcontractors report is included as an appendix in the laboratory's final report.

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<div style="font-size: 24pt; font-weight: bold; margin: 0;">ESI</div>	EnviroSystems, Inc. 1 Lafayette Road Hampton, NH 03842	Voice: 603-926-3345 FAX: 603-926-3521	ESI Job No:
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CHAIN OF CUSTODY DOCUMENTATION												
Client:		Contact:				Project Name:						
Report to:		Address:				Project Number:				Task:		
Invoice to:		Address:				Project Manager:						
Voice:		Fax:				email:				P.O.No:		

Lab Number <small>(assigned by lab)</small>	Your Field ID: <small>(must agree with container)</small>	Date Sampled	Time Sampled	Sampled By	Grab or com- posite (G/C)	No	Container Size (mL)	Type (P/G/T)	Field Preser- vation	Matrix S=Solid W=Water	Filter N=Not needed F=Done in field L=Lab to do	Analyses Requested/ Special Instructions:

Relinquished By: _____ Date: _____ Time: _____	Received By: _____ Date: _____ Time: _____
Relinquished By: _____ Date: _____ Time: _____	Received at Lab By: _____ Date: _____ Time: _____
Comments: _____	

COC Number:	Sample Delivery Group No: _____ Page _____ of _____
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Figure 7-2. Chronic Sample Receipt Record

SAMPLE RECEIPT RECORD FOR CHRONIC TOXICITY EVALUATIONS															
STUDY #:						CLIENT:									
SAMPLE RECEIPT INFORMATION															
	Start Sample				First Renewal				Second Renewal						
Sample Receipt Date & Time:															
Received By:															
Delivered Via:	Fed Ex	UPS	Client	Courier	ESI	Fed Ex	UPS	Client	Courier	ESI	Fed Ex	UPS	Client	Courier	ESI
Logged Into Lab By:															
Date & Time Logged In:															
SAMPLE CONDITION INFORMATION															
Chain of Custody?	Yes	or	No		Yes	or	No		Yes	or	No				
Chain of Custody Signed?	Yes	or	No		Yes	or	No		Yes	or	No				
Chain of Custody Complete?	Yes	or	No		Yes	or	No		Yes	or	No				
Sample Date?	Yes	or	No		Yes	or	No		Yes	or	No				
Sample Time?	Yes	or	No		Yes	or	No		Yes	or	No				
Sample Type?	Yes	or	No		Yes	or	No		Yes	or	No				
Custody Seal in Place?	Yes	NA	No		Yes	NA	No		Yes	NA	No				
Shipping Container Intact?	Yes	or	No		Yes	or	No		Yes	or	No				
Temp Blank Temperature:															
DOES CLIENT NEED NOTIFICATION OF TEMP?	Yes	or	No		Yes	or	No		Yes	or	No				
Sample Arrived on Ice?	Yes	or	No		Yes	or	No		Yes	or	No				
COMMENTS:															

P:\GENERAL PROJECTS\FORMS\LABFORMS\Sample Receipt Record - Chronic 2013.wpd

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Laboratory Quality Assurance Manual
Sample Handling, Acceptance, Receipt and IdentificationSection: 7
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STUDY NO:

SDG No:

Project:

Delivered via:

Date and Time Received:

Date and Time Logged into Lab:

Received By:

Logged into Lab by:

Air bill / Way bill: No

Air bill included in folder if received

NA

Cooler on ice/packs:

Custody Seals present?

NA

Cooler Blank Temp (C) at arrival:

Custody Seals intact?

NA

Number of COC Pages:

COC Serial Number(s):

COC Complete:

Sampled Date: Yes

Does the info on the COC match the samples?

Yes

Field ID complete: Yes

Were samples received within holding time?

Yes

Sampled Time: Yes

Were all samples properly labeled?

Yes

Analysis request: Yes

Were proper sample containers used?

Yes

COC Signed and dated: Yes

Were samples received intact? (none broken or leaked)

Yes

Were all samples received? Yes

Were sample volumes sufficient for requested analysis?

Yes

Client notification/authorization: Not required

Were VOC vials free of headspace?

NA

pH Test strip ID number:

Field ID	Lab ID	Mx	Analysis Requested	Bottle	Req'd Pres'n	Verified Pres'n

Notes and qualifications:

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[illegible]

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Page: 1 of 10**8.0 LABORATORY EQUIPMENT AND PREVENTATIVE MAINTENANCE****8.1 Laboratory Equipment**

All laboratory equipment and software used in the analysis of samples shall be appropriate for the specified method, used only by authorized personnel, will meet the accuracy necessary for testing and calibration, and comply with specifications. Manufacturer's instructions will be available to all personnel or their location referenced. Equipment and software will be safeguarded from adjustments that would invalidate the testing and calibration results. Up-to-date instruction on the use and maintenance of equipment will be readily available to operating personnel. Reference to operating manuals will be supplied in the applicable technical SOP.

All laboratory equipment is maintained in proper working order and within manufacturer's specifications while in use in the laboratory. Raw data records are retained to document equipment performance. Equipment that is not in working order or fails to provide accurate data within calibration specifications is labeled and removed from service. A determination is made regarding repair and disposal options. Equipment removed from laboratory use is detailed in the equipment list spreadsheet, which is maintained by the QAU. If a piece of equipment is found to be defective and requires service, data generated prior to the finding of fault are to be inspected in order to determine if previously reported data reports need to be amended and clients need to be informed. See section 5.7.1 for more information on client notification for nonconforming work.

New equipment must be formally received by the laboratory prior to use and will be labeled to reflect their status. New equipment is calibrated and given a unique identifier. Equipment is monitored on a regular basis to ensure compliance with operating conditions. All quantitative laboratory equipment is serviced twice per year by an independent agency to ensure compliance with manufacturer's specifications. Intermittent preventive maintenance for each piece of quantitative laboratory equipment is conducted according to a written schedule, found either in the appropriate SOP or the instrument instruction manual. If a piece of equipment is removed from use for repair or major service, its performance shall be checked prior to being put back in general laboratory use. Records of all maintenance activities, including service calls, must be kept by the laboratory.

Table 8-2 provides a current summary of major pieces of laboratory equipment.

8.2 Computers and Software

New employees shall have initial training in computer security awareness, and have ongoing annual refresher training. Records of the training are maintained and available for review.

8.2.1 Computers

Computers shall be capable of supporting the required versions of software being used. Computer software shall be sufficiently robust so that data acquisition and analysis meet program requirements. Access to computers and stored data will be limited to staff members. Computers connected to the company network will require a user login and password. Passwords may be changed on an annual basis. The company computer network will be protected from outside sources either by appropriate software or by physically eliminating access. Physical access to the server will be limited.

Computer files will be backed up on the data server on a daily basis. Backups are sent offsite to Amazon Glacier cloud storage. System events such as log-on failures or break-

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in attempts are monitored by Montrose IT Support. IT Support protects the electronic data management system from the introduction of computer viruses and performs monthly testing of the system backups.

The QAU performs periodic (at least annually) inspections of the LIMS to ensure the integrity of electronic data. Records of the inspections will be submitted to management and will include notes of any problems identified with electronic data processing and the corrective actions taken.

8.2.2 Software

ESI maintains historical file of software used, software changes, and software version numbers in the electronic Equipment List. Software Manuals and operating procedures will be referenced in the applicable technical SOP. Software change requests are made to the Laboratory Director who will authorize the change. The software must be tested prior to implementation to ensure the software can meet requirements. Requirements to be met must be documented. The customer must be notified in writing of changes in the LIMS software or hardware configuration that will adversely affect customer electronic data within 15 business days of discovery.

8.2.2.1 Commercially Purchased Software

Commercially purchased software used within their designed application range will be considered to be sufficiently validated; however, in cases where the software has been modified, it will be validated. If software contains automatic tracking and auditing functions, they will be enabled.

8.2.2.2 Validation of Software

Validation of software will include, at a minimum, checking calculations made by the spreadsheet program to ensure they are correct. This validation will include use of data that provides a known result and use of invalid data or an invalid entry that should produce an invalid final answer. Validations for spreadsheets are made before initial use and after changes to equations or formulas, including software revisions and upgrades. Printouts from spreadsheets will include all information used to calculate data. Results of the validation will be reported and a record of the validation report will be maintained by the QAU.

8.3 Glassware

All glassware used in the laboratory is maintained in good condition, cleaned, properly stored, and organized according to its specific laboratory application. Chipped, cracked or otherwise defective glassware is either discarded or repaired. All volumetric glassware used in the laboratory is either class "A" or class "B" certified. Class A volumetric glassware will be checked upon evidence of deterioration. Class B volumetric glassware will be checked by lot prior to first use and upon evidence of deterioration.

8.3.1 Glassware Cleaning

Laboratory glassware and washable equipment are systematically cleaned prior to use, according to the application of the item. Cleaning instructions are found in the applicable technical laboratory support SOPs.

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8.3.2 Inhibitory Residue

Prior to use, all lots of laboratory detergent are checked for inhibitory residue, using the heterotrophic plate count procedure detailed in Standard Methods (Method 9020-5a.2). This test is performed when a new lot of detergent is purchased for the lab and at least annually. Any adverse findings will necessitate a new lot or brand of detergent.

8.4 Consumable Equipment and Laboratory Supplies

Consumable equipment and laboratory supplies (such as glassware, chemicals, disposable plastics, etc.), will be accepted for receipt by the laboratory if the shipment is free from damage and the items received match the items ordered. Packing slips will be reconciled with the received items and the items identified in the electronic order list, known as the Wish List. This review will be signified by entry of the received date and the receiver's initials in the Wish List and the packing slip. Packing slips will then be forwarded to the Accounting Department for processing.

Records for supplies that may affect the quality of environmental tests must include the following, where applicable:

- a) Date of receipt
- b) Expiration date
- c) Source
- d) Lot or serial number
- e) Calibration and verification records
- f) Accreditation or certification certificates

Depending upon the item type, the item and the information outlined above will be logged into the appropriate logbook. All items are logged into the "Chemical Inventory and Receipt Log" (A-Book) and, additionally, may be logged into the "Organic Standards Preparation" (O-Book) record, the "Material Receipt Log" or the "Microbiology QA Logbook" (M-Book). Prior to storage, containers are labeled with a unique identifier and expiration date.

Reagent and standard chemicals without a manufacturer's assigned expiration date are assigned an expiration date of 10 years. Because of cost, availability or environmental conservation concerns, a chemical may be re-assigned an expiration date as directed by the Laboratory Director when it is determined that the chemical is reasonably expected to be stable and retain the properties for which it may be used. Documentation for the extension is retained with certificates of analysis and the chemical is assigned a new chemical inventory ID.

Certificates of analysis and calibration records (e.g., thermometer, pipette, probe or electrode certificates) shall be retained and stored appropriately by the QAU. Certificates and records may be labeled with item ID. Microbiology records are held in the Material Receipt Literature section of the Microbiology QA Logbook. Certificates for standards are maintained in logbooks located within the pertinent laboratory.

8.5 Preventative Maintenance

Preventative maintenance is routinely performed on each piece of analytical equipment, to maximize instrument performance and accuracy and minimize downtime and interruptions. Suggested schedules for preventative maintenance programs are detailed in applicable SOPs. Designated laboratory personnel are trained in routine maintenance procedures for major analytical equipment. Repairs, when necessary, are performed by either trained staff or instrument manufacturer service.

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personnel. If an instrument needs to be shipped to a service center for repair or maintenance, it must be done in such a manner as to protect the instrument from damage and contamination. Dates when instruments are checked or calibrated by either in-house staff or contractors are logged.

For each SOP that involves operation of an instrument, basic instructions and maintenance procedures are included. Logbooks documenting preventive maintenance, non-routine maintenance and repairs are also maintained for each instrument. More detailed information is found in SOP QA-1102 "Use, Calibration and Maintenance of Laboratory Equipment". Procedures for maintenance of specific analytical instrumentation (i.e. ICP, Lachat, TOC analyzer, etc.) are thoroughly detailed in the appropriate SOPs.

Table 8-1. Preventive Maintenance - General Laboratory Equipment^{1,2}

ITEM	Monitoring / Maintenance Frequency
Standby Generator	Check engine hours and fluids monthly; serviced annually, check run weekly
Deionized Water System	Check system lights daily; service as required. Check calibration of meters and visual displays annually.
Fume Hoods & Canopies	Check and record flow at least monthly
Incubators and Environmental Chambers	Check temperature daily; clean condensers as needed
Refrigerators and Freezers	Check temperature daily; clean condensers as needed
Drying Ovens	Check temperature daily; before and after use
Laboratory Orbital Shakers	Check speed when in use
Autoclaves	Check pressure and temperature with each use
Water Purification System	Change cartridges every 6 to 12 months
Waste Treatment System	Check bag filter at least biweekly
AutoCAT™ 9000 Amperometric Titrator	Daily check of titrant level, air bubbles in burette, and electrode and titrant status. Daily rinsing of probes. Piston plunger and burette leak checks recommended weekly. Burette and delivery tube replacements recommended annually.

¹ Note that this table is not all inclusive. The general condition of all laboratory instruments and equipment should be routinely checked prior to use and serviced as required, unless otherwise specified. See individual SOPs for more information on maintenance functions and frequencies.

² Out of range temperatures must have a corrective action within 24 hours.

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TABLE 8-2. Laboratory Equipment

EnviroSystems, an Affiliate of Enthalpy Analytical Capital Equipment List Updated: 05/15/19										
Item #	Description	Unit ID	Serial #	Qty	Manufacturer	Model	Purchase	Location	Condition on Receipt	Current Status
Note: Items purchased prior to 1992 were acquired by ESI as part of its acquisition of assets from Millipore Corporation in 1992.										
E-1101	Incubator, Hi-Lo, 72 cu ft	#2	17071388H	1	Jordan	FT3TRGBOD	1988	2nd Floor	New	Operational
E-1102	Incubator, Hi-Lo, 72 cu ft	#1	17071488H	1	Jordan	FT3TRGBOD	1988	2nd Floor	New	Operational
E-1103	Incubator, Hi-Lo, 24 cu ft	#6	17124689A	1	Jordan	FT-1W-TRGBOD	1989	2nd Floor	New	Operational
E-1104	Incubator, Hi-Lo, 48 cu ft	#8	WUH807065	1	Revco	CCH-017DK	1990	2nd Floor	New	Operational
E-1105	Incubator, Hi-Lo, 48 cu ft	#7	WUH02327	1	American Scientific	CCH-017DK	1990	2nd Floor	New	Operational
E-1106	Incubator, Hi-Lo, 48 cu ft	#4	WUH02328	1	American Scientific	CCH-017DK	1990	2nd Floor	New	Operational
E-1107	Incubator, Hi-Lo, 48 cu ft	#5	WUH46488	1	Revco	CCH-017DK	1988	2nd Floor	New	Operational
E-1108	Refrigerator, 48 cu ft	C	S5944591D	1	Jordan	SAKT-48	1991	2nd Floor	New	Operational
E-1109	Refrigerator, 48 cu ft	A	C5067087E	1	Jordan	VWT-4-G	1988	2nd Floor	New	Operational
E-1110	Refrigerator, 48 cu ft	B	S5067087E	1	Jordan	AT-5-GB	1987	2nd Floor	New	Operational
E-1111	Freezer, 21 cu ft	PRL-45	WB94912731	1	Frigidaire	USF-19E	1988	2nd Floor	New	Operational
E-1113	Water Bath	CTI #303	30100004	1	Fisher Scientific	636D	1993	2nd Floor	New	Operational
E-1114	Coliform Incubator	#300	3432	1	Millipore		1990	2nd Floor	New	Operational
E-1118	Muffle Furnace	MF#1	AKN8338-130	1	NEY	M-525-511	1993	1st Floor	New	Not in Use
E-1121	Balance, Top Loading		H43112	1	Mettler	PJ4000	1990	1st Floor	New	Operational
E-1123	Hood, Ductless		17043	1	Captair	5000C	1990	1st Floor	New	Not in Use
E-1125	Autoclave	T-252	95-2678	1	Market Forge	Sterilmatic	1992	2nd Floor	New	Operational
E-1129	U.V. Sterilizer	UV	U.V. Sterilizer	1	Millipore		1990	2nd Floor	New	Operational
E-1130	Vacuum Pump		1060-W	1	Gast	03120V4A	1990	Mobile	New	Not in Use
E-1131	Orbital Shaker		1190-1074	1	Lab-Line	3590	1990	2nd Floor	New	Operational
E-1132	Orbital Shaker		1190-1074	1	Lab-Line	3590	1990	2nd Floor	New	Not in Use
E-1133	Magnetic Stir Plate - 6		0885-0091	1	Lab-Line	127B	1985	2nd Floor	New	Operational
E-1134	Incubator - Walk-In	TCR 200	96129	1	Harris Environmental		1989	2nd Floor	New	Operational
E-1135	Incubator - Walk-In	TCR 101		1	Harris Environmental		1991	1st Floor	New	Operational
E-1136	Deionized Water System		08363-C	1	Millipore Corporation	Mili-Q Plus	1988	2nd Floor	New	Operational
E-1143	Microscope, Compound		753413	1	Bristolscope		1985	Mobile	New	Operational
E-1144	Microscope, Compound		994853	1	Olympus	CH-2	1990	Mobile	New	Operational
E-1145	Microscope, Compound		214842	1	Olympus	BH-2	1989	Mobile	New	Operational
E-1146	Microscope, Disecting		287470	1	Olympus	VM-ILA-2	1989	Mobile	New	Operational
E-1147	Microscope, Disecting		292279	1	Olympus	VM-ILA-2	1989	Mobile	New	Operational
E-1148	Microscope, Disecting		287427	1	Olympus	VM-ILA-2	1989	Mobile	New	Operational
E-1152	Refractometer	#1	9405	1	Atago	S/MII	1994	Mobile	New	Unknown
E-1154	Magnetic Stir Plate		30719428	1	Thermolyne	Nuova II	1989	Mobile	New	Unknown
E-1155	Magnetic Stir Plate/Heated			1	Corning	PC-520	1989	Mobile	New	Unknown
E-1166	Magnetic Stir Plate	#5		1	VWR Scientific	Model 360	1991	Mobile	New	Unknown
E-1167	Magnetic Stir Plate	#4		1	VWR Scientific	Model 360	1991	Mobile	New	Unknown
E-1168	Magnetic Stir Plate	#300		1	VWR Scientific	Model 360	1991	Mobile	New	Unknown
E-1169	Magnetic Stir Plate	#2		1	VWR Scientific	Model 360	1991	Mobile	New	Unknown
E-1170	Magnetic Stir Plate	#1		1	VWR Scientific	Model 360	1991	Mobile	New	Unknown
E-1172	Magnetic Stir Plate	#9		1	VWR Scientific	Model 360	1991	Mobile	New	Unknown
E-1173	Magnetic Stir Plate	#7		1	VWR Scientific	Model 360	1991	Mobile	New	Unknown
E-1176	Dessicator	2		1	Bel Art		1991	Mobile	New	Operational
E-1177	Dessicator	10		1	Bel Art		1991	Mobile	New	Operational
E-1178	Dessicator	9		1	Bel Art		1991	Mobile	New	Operational
E-1179	Dessicator	16		1	Bel Art		1991	Mobile	New	Operational
E-1180	Dessicator	15		1	Bel Art		1991	Mobile	New	Operational
E-1181	Dessicator	18		1	Bel Art		1991	Mobile	New	Operational

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E-1182	Dessicator	12		1	Bel Art		1991	Mobile	New	Operational
E-1183	Dessicator	17		1	Bel Art		1991	Mobile	New	Operational
E-1184	Dessicator	21		1	Bel Art		1991	Mobile	New	Operational
E-1185	Dessicator	19		1	Bel Art		1991	Mobile	New	Operational
E-1186	Dessicator	20		1	Bel Art		1991	Mobile	New	Operational
E-1190	Hot Plate		611950365602	1	Thermolyne	Cimarec 3	1995	1st Floor	New	Unknown
E-1191	Hot Plate		611950365603	1	Thermolyne	Cimarec 3	1995	1st Floor	New	Unknown
E-1192	Deionized Water System	CFOF-012-05		1	Millipore Corporation	Mill-Q Water System	1997	1st Floor	New	Operational
E-1196	Drying Oven	Oven #4	60900135	1	Fisher Scientific	Model 650G	1996	1st Floor	New	Operational
E-1197	Hood, Ducted	#1		1			1993	1st Floor	New	Operational
E-1198	Hood, Ducted	#2		1			1993	1st Floor	New	Operational
E-1199	Hood, Canopy	#3		1	Hemco		1992	1st Floor	New	Operational
E-1200	Hood, Canopy	#6		1			1992	1st Floor	New	Operational
E-1201	Hood, Canopy	#5		1			1997	1st Floor	New	Operational
E-1202	Balance, Analytical - 0.1 mg	1202	J93681	1	Mettler	AE100	1997	1st Floor	New	Not in Use
E-1204	Refrigerator, 200 cu ft Walk In	K		1	Westlake		1997	1st Floor	New	Operational
E-1205	Hot Plate			1			1997	2nd Floor	Used	Unknown
E-1214	Refrigerator, 840 cu ft Walk In	TCR102		1	Bush Refrigeration		1999	1st Floor	New	Operational
E-1217	Mixer - Commercial Baking		11-196-869	1	Hobart	C-1007	2000	2nd Floor	Used	Operational
E-1219	Centrifuge - Refrigerated		62592	1	Beckman	J-8B	2000	1st Floor	Used	Operational
E-1220	TOC Analyzer - Phoenix 8000		0022401	1	Tekmar-Dorhman	14-705-200	2000	2nd Floor	New	Operational
E-1221	TOC Analyzer - Autosampler		190H0223	1	Tekmar-Dorhman		2000	2nd Floor	New	Operational
E-1222	Muffle Furnace 1.5 Cubic Feet	MF#2	803U0021	1	Fisher Scientific	550-126	2000	1st Floor	Used	Operational
E-1230	Vacuum Pump		703253606	1	Gast	03120V4A	2001	Mobile	New	Unknown
E-1231	Coliform Incubator	#302	664	1	Scientific Products	200	2000	2nd Floor	Used	Operational
E-1242	pH Meter	470, N/A	AB81212687	2	Accumet	AB15	2002	1st & 2nd Fl	New	Operational
E-1244	Gas Chromatograph- FID/micro ECD	GC1	US10205120	1	Agilent	6890	2003	1st Floor	New	Operational
E-1245	Gas Chromatograph	GCMS1	US00042228	1	Agilent	6890N	2003	1st Floor	New	Operational
E-1246	Mass Spectrometer (VOC's)		US40546499	1	Agilent	5973	2003	1st Floor	New	Operational
E-1247	Purge and Trap (VOC's)		0034001	1	Tekmar-Dorhman	3100	2003	1st Floor	Used	Operational
E-1248	Injector (sVOC's)		US11418456	1	Agilent	7683	2003	1st Floor	Used	Operational
E-1251	Mercury Controller		181	1	PSA Merlin	10-023	2003	1st Floor	Used	Not in Use
E-1252	Hood, Polyethylene	#4		1			2003	1st Floor	New	Not in Use
E-1253	Air Compressor		A17910449	1	Coleman	VL050211201	2003	1st Floor	New	Operational
E-1256	DO Meter - For BOD use		0480563	1	YSI	5100	2004	2nd Floor	New	Operational
E-1257	Repeat Pipette	P1-044	4800553	1	Fisherbrand	2000	2004	1st Floor	New	Operational
E-1259	Spectrophotometer		1102040585653	1	Barnstead Turner	SP-830	2004	1st Floor	Used	Operational
E-1266	Gas Chromatograph		CN10413073	1	Agilent	6890N	2005	1st Floor	New	Operational
E-1267	Mass Spectrometer		US10460536	1	Agilent	5973N	2005	1st Floor	New	Operational
E-1268	Vacuum Pump		487	1	Gast	0211V45NG8CX	2004	2nd Floor	New	Unknown
E-1271	ICP - MS Octapole Reaction System		JP51201619	1	Agilent	7500 Series CE	2007	First Floor	New	Operational
E-1272	Gas Chromatograph Detectors - micro ECD	GC2	US10142072	1	Agilent	6890N	2007	First Floor	New	Operational
E-1273	Refrigerator, 440 cu ft Walk In	F		1	Bush Refrigeration		2007	First Floor	New	Operational
E-1275	Amperometric Titrator		689R080N004	1	Hach	AutoCAT 9000	2008	2nd Floor	New	Operational
E-1276	TOC Analyzer - Solid Phase Module		9105176	1	Dohrmann		2008	2nd Floor	Used	Operational
E-1277	Incubator - Bacteria	#309	3068905	1	Cole Palmer		2009	2nd Floor	Used	Operational
E-1282	Refrigerator, 48 cu ft	W	DS756918	1	General Electric	CTX14CAZBLWH	2012	1st Floor	New	Operational

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E-1284	Refrigerator, 2.6 cu ft	Y2	1210002147	1	Magic Chef	HMBR265WE	2013	1st Floor	New	Operational
E-1285	Centrifuge - Refrigerated		62782	1	Beckman	J-8B	2012	1st Floor	Used	Operational
E-1286	Light Meter		12090428	1	EXTech Instruments	LT300	2013	Mobile	New	Operational
E-1287	Turbidimeter		2000005470	1	Hach	2100 AN	2013	1st Floor	Used	Operational
E-1288	Lachat		6060000304	1	Lachat	QuickChem 8500	2014	1st Floor	Used	Operational
E-1289	Ion Chromatograph		98050590	1	Dionex	DX-120	2014	1st Floor	Used	Operational
E-1290	Freezer, 21 cu ft	R	WB90353984	1	Kenmore	253 2804 289	2009	2nd Floor	New	Operational
E-1295	Handheld Multiparameter Meter	MP01	13K100158	1	YSI	Professional Plus	2013	Mobile	New	Operational
E-1296	Walk In Refrigerator	S		1	Hartford		2014	Storage	New	Operational
E-1297	DO Meter	#24	94101344	1	YSI	Model 58		2nd Floor	New	Operational
E-1298	Conductivity Meter	YSI30E	10K101306	1	YSI	Model 30		2nd Floor	New	Operational
E-1299	pH Meter	#1097	1097	1	Fisher Scientific	Basic Model		2nd Floor	New	Operational
E-1300	Handheld Multiparameter Meter	MP02	13K101876	1	YSI	Professional Plus	2013	Mobile	New	Operational
E-1301	Handheld Multiparameter Meter	MP03	13B100138	1	YSI	Professional Plus	2013	Mobile	New	Operational
E-1302	Analytical Balance		1124024313	1	Ohaus	Discovery - DV215CD	Jun-15	2nd Floor	New	Operational
E-1303	Analytical Balance, top loader	1303	6462	1	Ohaus	GT2100		1st Floor	New	Not in Use
E-1304	Light Meter	1304	1673	1	Apogee	MQ-100	2015	1st Floor	New	Operational
E-1305	Polyethylene Hood			1	Custom Build		2015	1st Floor	New	Operational
E-1306	Block Digestion Unit			1			2015	1st Floor	Used	Operational
E-1307	ICP - MS		JP15380157	1	Agilent	7800 Series	2016	1st Floor	New	Operational
E-1308	Mercury Analyzer Absorbance / Fluorescence		11608001	1	Brooks Rand	Model III	2016	1st Floor	New	Operational
E-1309	Mercury Autosampler		5602A40729	1	Brooks Rand	17400	2016	1st Floor	New	Operational
E-1310	Mercury Purge Module		8169401	1	Brooks Rand	Merx Total Hg Direct Purge	2016	1st Floor	New	Operational
E-1311	VOC Autosampler		CENT9519081117	1	Centurion	Centurion W/S	2017	1st Floor	New	Operational
E-1312	YSI MultiLab Meter	ML 01	17191533	1	YSI	4010-3	2017	2nd Floor	New	Not in Use
E-1313	UV Sterilizer 115V/60Hz		1217M66	1	Millipore Corporation	XX8370000	2016	2nd Floor	New	Operational
E-1314	Gas Chromatograph		CN18063184	1	Agilent	7890B	2018	1st Floor	New	Operational
E-1315	Mass Spectrometer		US1443L433	1	Agilent	5977MSD	2018	1st Floor	New	Operational
E-1316	GC Sampler Tray			1	Agilent	7693	2018	1st Floor	New	Operational
E-1317	GC Injection Tower		CN18090140	1	Agilent	64513A	2018	1st Floor	New	Operational
E-1318	Heating Mantle 1		112028/1	1	Brisk Heat	HMI1000-HSI		1st Floor	New	Operational
E-1319	Heating Mantle 2		1355403	1	Glas-Col	0408		1st Floor	New	Operational
E-1320	Heating Mantle 3		136052-2	1	Brisk Heat	HMI1000-HSI		1st Floor	New	Operational
E-1321	Heating Mantle 4		1301985	1	Glas-Col	0408		1st Floor	New	Operational
E-1322	Heating Mantle 5		1563765	1	Glas-Col	0408		1st Floor	New	Operational
E-1323	Heating Mantle 6		221785/3	1	Brisk Heat	HMI1000-HSI		1st Floor	New	Operational
E-1324	Inorg. Hot Plates		948	1	LabLine	5000-2		1st Floor	New	Operational
E-1325	Deionized Water System Milli-Q			1	Millipore Corporation	CF0F-01205		1st Floor	New	Operational
E-1326	Gas Chromatograph		CN10716050	1	Agilent	6890N	2018	1st Floor	New	Operational
E-1327	Mass Spectrometer		US469A4847	1	Agilent	5975MSD	2018	1st Floor	New	Operational
E-1328	GC Sampler Tray		CN6414373	1	Agilent	7683B	2018	1st Floor	New	Operational
E-1329	GC Injection Tower		CN64536828	1	Agilent	7683B	2018	1st Floor	New	Operational
E-1330	Presto 1		28701-4-1	1	Presto	0704717		1st Floor	New	Operational
E-1331	Presto 2		28701-1-1	1	Presto	0704717		1st Floor	New	Operational
E-1332	Presto 3		28670-8	1	Presto	0704717		1st Floor	New	Operational
E-1333	Orbital Shaker		1525	1	VWR Scientific	980001		1st Floor	New	Operational
E-1334	Black Extract Fridge			1	Kenmore			1st Floor	New	Operational
E-1335	Digestion Apparatus		424947	1	Hach	Hach		1st Floor	New	Operational

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Item #	Description	Unit ID	Serial #	Qty	Manufacturer	Model	Purchase	Location	Condition on Receipt	Current Status
E-1336	Fridge Z	Z	BA81228688	1	Frigitaire	AD-18		1st Floor	New	Operational
E-1337	Tissuemizer		8809731	1	Tecmar	TR-10		1st Floor	New	Operational
E-1338	Metals Digestion Block		2017CEC4736	1	Environmental Express	SC100	Oct-17	1st Floor	New	Operational
E-1339	N-EVAP 111		51928	1	Organomation Assoc.	5085	Feb-18	1st Floor	New	Operational
E-1340	Metals Digestion Microwave		82472306	1	Anton Paar	MultiWave Go	April-18	1st Floor	New	Operational
E-1341	Metals Digestion Microwave		82472375	1	Anton Paar	MultiWave Go	April-18	1st Floor	New	Operational
E-1342	Refrigerant Recirculator		198299084	1	Neslab	CFT-75		1st Floor	New	Operational
E-1343	GC Autosampler Tray		CN85042355	1	Agilent	7683		1st Floor	New	Operational
E-1344	GC Injection Tower		CN14422964	1	Agilent	7683		1st Floor	New	Operational
E-1345	GC02 Coolant Fridge			1	Haier			1st Floor	New	Operational
E-1346	Fridge J	J		1	Danby			1st Floor	New	Operational
E-1347	Fridge H	H		1	Emerson			1st Floor	New	Operational
E-1348	Fridge 3	3		1	Haier			1st Floor	New	Operational
E-1349	Ion Gauge Controller			1	Agilent	59864B		1st Floor	New	Operational
E-1350	GC01 Autosampler Tray		V902508446	1	Agilent	7683		1st Floor	New	Operational
E-1351	GC01 Injection Tower		T0218-08	1	Agilent	7683		1st Floor	New	Operational
E-1352	GC02 Autosampler Tray		U511111029	1	Agilent	7683		1st Floor	New	Operational
E-1353	GC02 Injection Tower		T0824-01	1	Agilent	7683		1st Floor	New	Operational
E-1354	Autosampler Lachat		17583	1	Lachat Instrument	ASX-410		1st Floor	New	Operational
E-1355	Lachat Reagent Pump		A82000-1650	1	Lachat Instrument	RP-150		1st Floor	New	Operational
E-1356	IC Autosampler		055-987-3629	1	Dionex	AS-40		1st Floor	New	Operational
E-1357	Heat Exchanger ICP-MS		3F1580193	1	Agilent	G1879B		1st Floor	New	Operational
E-1358	Heat Exchanger ICP-MS		G58368	1	Agilent	G1879B		1st Floor	New	Operational
E-1359	Sonicator		RVB070150519	1	Fisher Scientific	FS110H		1st Floor	New	Operational
E-1360	Cyanide Pump		7520-35	1	Cole Palmer	7520-35		1st Floor	New	Operational
E-1361	Autosampler ICP-MS (Old)		040671A-520	1	CETAC	ASX-520		1st Floor	New	Operational
E-1362	Vacuum Pump ICP-MS (Old)		066073002	1	Edwards	E2M18		1st Floor	New	Operational
E-1363	Autosampler ICP-MS (New)		AU15340440	1	Agilent	SPS5		1st Floor	New	Operational
E-1364	Vacuum Pump ICP-MS (New)		IT1518A067	1	Agilent	DS402		1st Floor	New	Operational
E-1365	Metals Hood			1	ESI	Metals Hood		1st Floor	New	Operational
E-1366	Presto 4		28701-5-1	1	Presto	07047		1st Floor	New	Operational
E-1367	Dissection Microscope			1	LW Scientific	LW Scientific		2nd Floor	New	Operational
E-1368	pH Meter		AB92321502	1	Fisher Scientific	Accumet AB15		2nd Floor	New	Operational
E-1369	Conductivity Meter		08K100546	1	YSI	30D		2nd Floor	New	Operational
E-1370	Boat Sampling Module		9108564	1	Dohrmann	183		2nd Floor	New	Operational
E-1371	Magnetic Stir Plate	#3		1	VWR Scientific	360		2nd Floor	New	Operational
E-1372	Magnetic Stir Plate	#6		1	VWR Scientific	360		2nd Floor	New	Operational
E-1373	Top Loader Balance			1	Mettler Toledo	PG-S	05/08/18	1st Floor	New	Operational
E-1374	Vacuum Pump		A17360144	1	GAST	0211-143-GBCX	2018	2nd Floor	New	Operational
E-1375	YSI MultiLab IDS Meter	ML 02	17430040	1	YSI	4010-3	05/04/18	2nd Floor	New	Operational
E-1376	Analytical Balance 0.1/0.01mg		15203801	1	A and D	HR-202i	05/05/18	1st Floor	New	Operational
E-1377	SPS 4 Autosampler		AU17172909	1	Agilent	G8410A	05/15/18	1st Floor	New	Operational
E-1378	ICP - MS		SG18113085	1	Agilent	7800	05/15/18	1st Floor	New	Operational
E-1379	Vacuum Pump		IT1807V199	1	Agilent	9499225M008	05/15/18	1st Floor	New	Operational
E-1380	Freezer for Extractions			1	Magic Chef	MCUF3V2	05/28/18	1st Floor	New	Operational
E-1381	Freezer for Volatiles			1	Magic Chef	MCUF3V2	05/28/18	1st Floor	New	Operational
E-1382	Solid Phase Vacuum Manifold			1	Restek	Resprep	08/21/18	1st Floor	New	Operational
E-1383	Vacuum Pump		1180896	1	Thomas	TA-0040-V	Start-08/21/18	1st Floor	Used	Operational
E-1384	TurboVap II			1	Zymark	TurboVap II	Start-	1st Floor	Used	Out of Service
E-1385	Biotage TurboVap II	Unit 1	TV1410N20339	1	Biotage	TurboVap II	10/22/18	1st Floor	Used	Operational
E-1386	TOC Analyzer		US18304006	1	Teledyne Tekmar	LoFix	12/21/18	1st Floor	New	Operational

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E-1387	TOC LSS Boat Module		US18257008	1	Teledyne Tekmar	LSS Boat	12/21/18	1st Floor	New	Operational
E-1388	Spectrophotometer		930800025959	1	Hach	DR/2000	01/14/19	1st Floor	Used	Operational
E-1389	QUANTI-TRAY Sealer		QTP13184304416	1	IDEXX	Sealer Plus	12/21/18	2nd Floor	New	Operational
E-1390	Flow Meter		RE107321	1	Restek	ProFLOW 6000	01/24/19	1st Floor	New	Operational
E-1391	Reactor/Mini Hot Block		930800009265	1	Hach	CCO Reactor	01/14/19	1st Floor	Used	Method Val
E-1392	Extract Evaporator	Unit 2	182500571	1	Blotage	TurboVap II	02/13/19	1st Floor	New	Operational
E-1393	Extractions/TCLP Tumbler			1	ESI		01/01/08	1st Floor	Used	Operational
E-1394	SimpleDist Digestion Block		2018DISW1227	1	Environmental Express	C6002	03/01/19	1st Floor	New	Method Val
E-1395	SimpleDist Distillation Manifold			1	Environmental Express		03/01/19	1st Floor	New	Method Val
E-1396	Saltwater Board for Lachat			1	Lachat Instrument		05/15/19	1st Floor	New	Method Val

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9.0 CALIBRATION PROCEDURES AND FREQUENCY

ESI is furnished with all items of equipment required for correct performance of testing and calibration. The equipment and software meet the accuracy necessary for testing and calibration, and comply with specifications. Equipment is operated by authorized personnel. Up-to-date instruction on the use and maintenance of equipment is readily available to operating personnel. All instruments and equipment used in the laboratory must follow a well defined calibration and maintenance schedule to ensure data produced are of a known quality. All equipment will be checked and calibrated before initial use to ensure it meets specification requirements prior to being put into service. Calibration may be accomplished by laboratory personnel using certified reference materials traceable to the National Institute of Standards and Technology (NIST), EPA certified materials, or by external calibration agencies or equipment manufacturers. Calibrations carried out by service providers or carried out internally must be traceable to the International Systems of Units (SI) through a national standard.

The discussion presented here is general in nature because the requirements for calibration are instrument (or equipment) and method-specific. Details of calibrations can be found in SOPs, published analytical methods and instrument operations manuals, and should be referenced when needed.

9.1 Standards and Traceability

Analytical standards are prepared from pure compounds or are purchased prepared from reputable vendors; they are used to prepare calibration and spiking standards. Standards and reagents purchased must meet the requirements of methods and procedures. The laboratory will maintain certificates of analysis and purity records to ensure purity will meet intended use. All records of standards, reagents, reference materials, and media (including preparations) must be maintained. Records shall include lot numbers, date of receipt, and recommended storage conditions (For more information on record management See section 11 of this QA Manual.)

Expiration dates of prepared standards cannot exceed the expiration date of the primary standard. Adherence to expiration dates must be maintained. If no expiration date has been assigned by the manufacturer, an expiration date of one year from the date of preparation, or the date first opened in the case of sealed ampules, is appropriate unless degradation prior to this date is observed. Degradation is defined as inconsistencies in the results generated from analysis of the sample matrix. Degraded standards must not be used, and should be immediately discarded in an appropriate manner consistent with waste disposal regulations. Standards may be held past assigned expiration dates, provided they show no signs of degradation, and are used for appropriate purposes. Any expired standard must be labeled "Expired - For Reference Use Only".

9.2 General Calibration Requirements**9.2.1 General Laboratory Equipment**

The calibration and accuracy of general laboratory equipment, including: pH, dissolved oxygen and conductivity meters, thermometers, and balances will be evaluated on a regular basis to confirm that the instruments are providing accurate and reliable data over the anticipated analytical range. Instrumentation that fails to meet calibration specifications will be removed from service and not returned to general laboratory use until the unit is repaired and has demonstrated proper function within the appropriate specifications. All records of instrument calibration and maintenance activity must be kept. The schedule for calibration functions is provided in Table 9-1.

9.2.2 Analytical Procedures

Calibration standard concentrations for each parameter are chosen to bracket the

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expected concentrations of those analytes in the sample and to operate within the linear response range of the instrument. Samples that fall outside of the calibration range are diluted until bracketed by the calibration standards. Calibration standards are typically prepared at a minimum of three concentration levels: zero, the reporting limit, and three to five or five to ten times the estimated method detection limit.

Calibration standards are prepared from materials of the highest available purity. To establish instrument calibration, working standards are prepared from concentrated working stock solutions. Standards are stored as necessary (i.e. refrigerated, kept from light). Data regarding their preparation is recorded in the appropriate Standards or Instrument Run Logs.

Instrumental responses to calibration standards for each parameter are subjected to an appropriate statistical test of fitness (least squares linear regression, quadratic equation or relative standard deviation of response factors, or as required by the method). The calibration must reflect an acceptable correlation of data points; acceptance criteria can be found in SOPs and published analytical methods. In cases where the calibration data are outside of these criteria, the analyst must rerun the calibration standards (meeting the same criteria), changing instrumental conditions as necessary.

Calibration curves are checked periodically with standard solutions from a different source than that of the calibration standards. These calibration checks (Initial Calibration Verification (ICV)) must meet acceptance criteria in order to prove that a full calibration is not necessary. There must be a passing initial calibration check at the beginning of a run. Continuing Calibration Verification (CCV) standards must be run when required by the analytical method every ten samples and at the end of the analytical session. The calibration checks on both ends (i.e. start and end) of a block of samples must be acceptable for that block of data to be accepted as valid. If this criterion is not met, a complete re-calibration is necessary, and any sample analysis affected must be repeated or appropriately qualified. The concentration of the check standards should be varied throughout the analytical run in order to check the full calibration range of the instrument.

Calibration standards are to be used only for instrument calibration and shall not be used for any other purpose that might invalidate their primary use. If calibration standards or reference standards must be shipped for certification, shipment must be done in such a manner as to prevent damage or cause the standard to become unacceptable.

9.3 Calibration Procedures

Records (dates, results, and copies of reports) and certificates of calibration (adjustments, acceptance criteria and due data of next calibration) will be maintained by the QAU. Certain pieces of equipment, such as balances, thermometers and pH meters, are normally calibrated with NIST traceable standard reference material. Some reference standards, such as balance weights and reference thermometers, are also calibrated on a regular basis by an accredited facility. The frequency of inspection and calibration verification will be specified in the appropriate Standard Operating Procedure.

9.3.1 Analytical Balances

When a balance is first put into use, it will be certified by an appropriate external agency across its range of use, and an uncertainty value will be calculated. The agency will provide documentation of this. This certification will serve for the life of the balance or until there are signs of deterioration.

The calibration of each balance is checked each day when the instrument is in use,

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using weights that are NIST traceable. Calibration weights are Class "1" or better and are recertified annually by an accredited facility. Every six months, calibration of the entire analytical range is checked by a qualified service technician. If balances are calibrated by an external agency, verification of their weights will be provided. All information pertaining to balance maintenance and calibration is found in the logbook for each piece of equipment. Additional details related to calibration procedures are included in SOPs for analytical balances.

9.3.2 Thermometers

The performance of liquid in glass thermometers and electronic thermometers must be calibrated prior to initial use. Liquid in glass thermometers are recalibrated every 6 months and electronic thermometers are recalibrated quarterly. Thermometers are checked against a NIST certified thermometer. Each thermometer is tagged with a unique identifier, and labeled with a correction factor, date of calibration and the next calibration due date and initials of analyst. In addition, working thermometers are visually inspected by laboratory personnel prior to use. Calibration temperatures and acceptance criteria are based upon the working range of the thermometer and the accuracy required for its use. Laboratory thermometer inventory and calibration data are maintained by the QAU.

Temperature data loggers are sent out annually for calibration by an outside provider. NIST certified reference thermometers are maintained for verifying calibration of working thermometers. Reference thermometers are provided with NIST traceability for initial calibration and are recertified annually by an outside provider.

9.3.3 pH Meters

At the beginning and end of each work day, each bench top pH meter in use is calibrated using pH 4, 7 and 10 buffer solutions. The calibration is then verified using a pH 7 buffer from a source different than the pH 7 calibration buffer. Calibration verifications must also be done once an hour or before use. The meter is calibrated every 6 months by an outside provider. If the results of a pH calibration verification are not within ± 0.05 SU of pH 7.0, the instrument is recalibrated and the calibration is again verified at pH 7.0 SU. If re-calibration does not bring the instrument into specification, the instrument is removed from service and repaired or replaced.

9.3.4 DO₂ Meters

At the beginning and end of each work day, each bench top DO₂ meter in use is calibrated using either DO₂-saturated water or water-saturated air, and is adjusted for temperature and barometric pressure. Calibration verifications must also be done once an hour or before use. The meter is calibrated every 6 months by an outside provider. If the DO₂ meter does not hold calibration, the instrument may be adjusted or recalibrated to bring the value within specifications. If re-calibration does not bring the instrument into specification, the instrument is removed from service and repaired or replaced.

9.3.5 Conductivity Meters

At the beginning and end of each work day, each bench top conductivity meter in use is calibration checked using a 1413 μ mhos solution prepared as per method specifications. If value is not within range, calibration is conducted using a 1413 μ S/cm at 25°C standard. Calibration verifications must also be done once an hour or before use. The meter is calibrated every 6 months by an outside provider. If the conductivity meter does not hold calibration, the instrument is recalibrated to bring the value within specifications. If re-

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calibration does not bring the instrument into specification, the instrument is removed from service and repaired or replaced.

9.3.6 YSI Professional Plus Series Multi Probe Meter

When in use, the meter is calibrated at the beginning of the work day for conductivity, DO, and pH. The YSI meter is calibrated typically once during the day using a 12900 μS at 25°C standard. Calibration verifications may also be done once an hour or before use depending on project-specific requirements using a 1413 conductivity check solution. The calibration for pH is conducted as described in Section 9.3.3. The meter has several options for DO calibration described in its user manual; however, the typical method is calibration of DO using air-saturated water. A container of aerated water and the probe's internal barometer will be used in the calibration process. The meter is calibrated every 6 months by an outside provider. If the DO₂ meter does not hold calibration, the instrument may be adjusted or re-calibrated to bring the value within specifications. If re-calibration does not bring the instrument into specification, the instrument is removed from service and repaired or replaced.

9.3.7 Automatic Pipettes

When an automatic pipette is first received, it will include certification of performance documentation. This certification will serve for the life of the pipette or until there are signs of deterioration. The calibration of automated pipettes must be checked prior to initial use and daily prior to use thereafter. The laboratory pipette inventory and calibration check data is maintained by the QAU. If the check does not provide acceptable results, then the pipette is removed from service and repaired or replaced.

9.3.8 Light Meters

When a light meter is first put into use, it will be calibration certified by an appropriate external agency for a minimum of one year. Annually, light meters will be sent to an external accrediting facility for NIST traceable calibration to ensure meter performance and accuracy. If the light meter does not provide acceptable results, then it is removed from service and repaired or replaced.

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TABLE 9-1. Calibration Frequencies

INSTRUMENT	CALIBRATION STANDARD	FREQUENCY	ACCEPTANCE CRITERIA
Balances	Certified Class "1" weights	Daily when in use (WIU)	Analytical balance: $\pm 0.1\%$ or ± 0.5 mg, whichever is greater. Top-loading balance: $\pm 2\%$ or 0.02g , whichever is greater.
	Certified with uncertainty	Prior to initiation and upon signs of deterioration	Based on outside assessment and determined accuracy
	Performance checked by outside provider	Biannually	In tolerance as specified by outside provider
Coliform Incubators	Performance checked by outside provider	Biannually	In tolerance as specified by outside provider
Certified Class "1" weights	Performance checked by outside provider	Annually	In tolerance as specified by outside provider
pH Meters (bench top)	Standardized with 3 buffers	Daily WIU and checked within hour of analysis	± 0.05 SU of target value
	Performance checked by outside provider	Biannually	In tolerance as specified by outside provider
DO ₂ Meters (bench top)	H ₂ O saturated air	Daily WIU and checked within hour of analysis	Rejected if instrument will not hold calibration
	Performance checked by outside provider	Biannually	In tolerance as specified by outside provider
Conductivity Meters (bench top)	1413 $\mu\text{S/cm}$ Conductivity standard	When not within 10% of conductivity solution target value	$\pm 10\%$ of target value
	1413 $\mu\text{S/cm}$ Conductivity check solution	Daily WIU and within hour of analysis	$\pm 10\%$ of target value
	Performance checked by outside provider	Biannually	In tolerance as specified by outside provider
Muffle Furnace	Performance checked by outside provider	Biannually	In tolerance as specified by outside provider
Refractometer	NA	Checked with DI before use	DI check results in a reading of 0 ppt
Microscopes	Performance checked by outside provider	Biannually	In tolerance as specified by outside provider
AutoCAT™ 9000 Amperometric Titrator	Phenylarsine Oxide (PAO) titrant	Checked daily WIU	Within method-specified limits

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INSTRUMENT	CALIBRATION STANDARD		FREQUENCY	ACCEPTANCE CRITERIA
YSI Professional Plus Series Multi Probe	pH	Performance checked by outside provider	Biannually	In tolerance as specified by outside provider
		Standardized with 3 buffers	Daily WIU and checked within hour of analysis	±0.05 SU of target value
	DO ₂	O ₂ saturated water	Daily WIU and checked within hour of analysis	Reject if instrument will not hold calibration
		Performance checked by outside provider	Biannually	In tolerance as specified by outside provider
	Conductivity	12900 µS at 25°C Conductivity Standard	Daily WIU	±10% of target value
		1413 µS/cm Conductivity Check Solution	Checked within hour of analysis (per method-specific requirements)	±10% of target value
		Performance checked by outsider provider	Biannually	In tolerance as specified by outside provider
NIST Traceable Thermometer	Performance checked by outside provider	Annually	In tolerance as specified by outside provider	
Thermometers	NIST traceable thermometer	Prior to first use. Liquid in glass: 2x annually Electronic: quarterly	Must be within ±1 °C of value; labeled with correction factor	
Temperature Data Loggers	Performance checked by outside provider	Annually	In tolerance as specified by outside provider	
Inductively Coupled Plasma Mass Spectrometry (ICP-MS) Instrument	Prepared Trace Metal standards	Daily WIU	Within method-specified limits	
Lachat Autoanalyzer	Standard prepared to specifications described in individual methods	Daily WIU	Within limits specified by method for individual compounds	
TOC Analyzer	Standards prepared for calibration range	Daily WIU	Within method-specified limits	
Gas Chromatography (GC) Instrument	Standards prepared for calibration range	Check daily WIU	Within method-specified limits	
Gas Chromatograph - Mass Spectrometry (GC-MS) Instrument	Standards prepared for calibration range	Check daily WIU	Within method-specified limits	
Mercury Analyzer	Standards prepared for calibration range	Daily WIU	Within method-specified limits	
Spectrophotometer	Standards prepared for calibration range	Daily WIU	Within limits specified by method for individual calibration range	
	Performance checked by outside provider	Biannually	In tolerance as specified by outside provider	
Turbidimeter	Prepared standards for calibration range	Daily WIU	Within method-specified limits	
Centrifuge	Performance checked by outside provider	Annually	In tolerance as specified by outside provider	
Automatic Pipettes	NA	Performance check held at accrediting facility upon signs of deterioration	In tolerance as specified by outside provider	

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INSTRUMENT	CALIBRATION STANDARD	FREQUENCY	ACCEPTANCE CRITERIA
	NA	Checked daily WIU	Bias: Mean within $\pm 2\%$ of nominal value Precision: RSD $\leq 1\%$ of nominal volume based on minimum of 3 replicate measurements
Light Meter	Performance checked by outside provider	Annually	In tolerance as specified by outside provider
Ion Chromatography (IC) Instrument	Standards prepared for calibration range	Daily WIU	Within method-specified limits
Volumetric Labware	NA	Class B checked by lot before first use; Class A and B checked upon evidence of deterioration	Bias: Mean within $\pm 2\%$ of nominal volume Precision: RSD $\leq 1\%$ of nominal volume (based on 10 replicate measurements)
Non-Volumetric Labware	NA	Checked by lot before first use or upon evidence of deterioration	Bias: Mean within $\pm 3\%$ of nominal volume Precision: RSD $\leq 3\%$ of nominal volume (based on 10 replicate measurements)
(Applicable only when used for measuring initial sample volume and final extract/digestates volume)			
Glass Microliter Syringe	NA	Checked upon receipt and upon evidence of deterioration	General certificate of bias & precision upon receipt. Replace if deterioration is evident.
Water Purification System	NA	Conductivity, pH, and TRC checked daily prior to use and monthly HPC checks	Purity: $>18 \mu\text{mhos}$ Specific conductivity: $<3.0 \mu\text{mhos/cm}$ pH: 5.50 - 7.50 SU TRC: $<0.02 \text{ mg/L}$ HPC: $<500 \text{ CFU/mL}$
	Performance checked by outside provider	Biannually	In tolerance as specified by outside provider
Autoclave	NA	Sterilization checked monthly, timer checked quarterly, temperature and pressure checked WIU	Sterilization: autoclaved ampule remains purple and non-autoclaved ampule turns yellow Timer: achieves accurate duration Temperature: $118 - 121^\circ\text{C}$ Pressure: $\geq 1.0 \text{ kg/cm}^2$
	Performance checked by outside provider	Annually	In tolerance as specified by outside provider
Drying Ovens	NA	Temperature checked daily, and prior to and after use	Within $\pm 5\%$ of set temperature
Monitoring of Refrigerator/Freezer Temperatures	Thermometers	Daily	Refrigerators: 0°C to 6°C Freezers: $\leq 10^\circ\text{C}$

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10.0 DATA REDUCTION AND REPORTING

All generated data undergoes a well-defined, documented, tiered review process before being reported to the client. Information is reviewed by analysts and/or management at several points, including reduction and reporting. The Quality Assurance Unit (QAU) will instruct appropriate staff in the conduct of a final review of documents prior to delivery to a client. In general, the QAU conducts a review of approximately 10% of the reports generated on a quarterly basis. Refer to Section 5.7, Corrective Actions, for a discussion of the procedures and time frame for handling data quality issues that may be identified during the review process.

10.1 Data Reduction

When primary data, otherwise known as "raw data", are manually generated, the data are recorded either in bound logbooks or on preprinted forms. Entries are made in black, indelible ink and are initialed and dated by the individual who makes the entry. Errors are corrected by drawing a single line through the entry and assigning an error code (Figure 10-1); this change is initialed and dated by the individual who makes the change. Raw data may not be obscured in any way. The use of white out is prohibited on all raw data, including instrumental hard copy.

The analyst who completes the analysis assembles all relevant raw data and results, including strip chart recordings, instrument settings and other information essential to data interpretation. For data that are reduced by manual calculations, the calculations are documented in a laboratory notebook or on an analyst's worksheet. Calculations and data transfers are checked.

10.2 Data Review

Each data report that supports the testing process for all samples received by the laboratory is thoroughly reviewed for completeness and accuracy to provide in depth and periodic monitoring of the data integrity. The technical review may be completed by an analyst or by management. After the technical review, it is routed to the reporting group for compilation of the final report.

10.3 Data Reports

All data segments pertaining to a particular study are channeled to the reporting group for assembly into the final report format and generation of the narrative. Reports to clients shall be generated with accurate data, and in such a manner that the data are clearly understood by the client and are presented objectively, without bias or comment. When included, opinions and interpretations shall only be contained in the case narrative. Additionally, when required, any non-accredited tests shall be clearly identified as such when claims of accreditation are made in the analytical report or in the supporting electronic or hard copy deliverables. The report is proofed and edited by a qualified member of the reporting group other than the individual who wrote the report. The finalized report is issued with a cover letter or transmittal letter signed by management.

10.3.1 Reporting Requirements

When a project does not have client-specified reporting criteria and it requires adherence with DoD standards, reporting will follow the requirements outlined in Appendix A of the QSM 5.1. For clients who do not need this level of reporting, the following elements will be considered to be the minimum reporting requirements:

- a) Cover page with report title
- b) Date of issuance (and month of assay start for toxicology studies)
- c) Name of laboratory, address, and phone number

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- d) Unique identifier for the report on each page in order to ensure that the page is recognized as part of the report; clear identification of the end of the report
- e) Name and address of the client
- f) Identification of the method used
- g) Sample information (site location; field identifier; corresponding laboratory code; date and time collected and received; description, condition and identification of the samples tested; and matrix as applicable)
- h) Analysis information (date and time of sample preparation and analysis)
- i) Reference to the sampling plan and procedure used by the laboratory where these are relevant to the validity or application of the results
- j) Units of measurement (specify dry weight or wet weight as applicable)
- k) Name, function and signature of person authorizing the report
- l) Where relevant, a statement to the effect that the results relate only to the items tested
- m) Where relevant, ID of statistical method
- n) For solid samples, a statement of whether the results are based on a dry weight or wet weight basis

Where relevant, the following items should also be included:

- o) Deviations from, additions to, or exclusions from the test method, and information on specific test conditions
- p) Statement of compliance or non-compliance with requirements, including definition of data qualifiers
- q) Statement of the estimated uncertainty of measurement
- r) Opinions and interpretations
- s) Additional information required by methods, clients or groups of clients
- t) Report revision number for amended and re-issued reports (see Section 10.3.7)
- u) Details of environmental conditions and identified failures

10.3.2 Reporting Qualified Data

It is occasionally necessary to qualify data when the accompanying quality control data are not within established performance criteria. Qualification of data alerts the data end user to the fact that the analysis was to some degree, flawed and that the precision and accuracy of the data produced may not fulfill the data quality objectives (DQOs) for that particular project. Based on the project DQOs, analytical data with qualifiers may not be appropriate for the intended use and re-evaluation of the samples may be necessary. It is the responsibility of the laboratory to provide the end user with sufficient information to determine the usability of qualified data. Additional project or client qualifiers may be added to reports as required. In these cases, the qualifier will be defined in the report.

Code:	Data Qualification Explanation:
B	Analyte found in reagent blank. Indicates possible reagent or background contamination; the contaminated blank value should be reported with the qualifier.
J	The reported value is an estimate: the concentration of the target analyte is below the reporting limit, value outside the calibration range, or certain QC criteria were not met.
N	Organic constituents were tentatively identified in the sample matrix, but confirmation is needed.
R	The sample results were rejected because of gross deficiencies in QC

Code:	Data Qualification Explanation:
B	Analyte found in reagent blank. Indicates possible reagent or background contamination; the contaminated blank value should be reported with the qualifier.
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	or method performance. Resampling or re analysis is necessary.
RND	Recovery not determined
U or ND	Target analyte was not detected
NC	Not calculated or analysis failed, insufficient sample to complete

10.3.3 Support Documentation

Support documentation may include any additional information required by methods, clients or groups of clients. In addition to copies of the chain of custody records and sample receipt records, the following documents may be included in an appendix: reports from subcontractors; copies of emails; client specific instructions; scopes of work; sampling plans; copies of courier way bills; images of samples; copies of corrective action reports; photographs or images of sample shipping containers and/or test organisms. For bioassay test reports, the data appendix will also include copies of all bench sheets and all statistical analysis reports. The scope of attachments appended to a report will be based on a client's sample analysis plan or scope of work.

10.3.4 Subcontractor Reports

Data from a subcontractor's report may be incorporated into an ESI report. In these cases, the report will clearly identify the analyses conducted by the subcontractor and provide the subcontractor's name and location. A full copy of the subcontractor's report will be included as part of a data appendix or as an attachment. Subcontractors must adhere to all requirements of ISO 17025 and proof of adherence available to the customer.

10.3.5 Report Format

Reports may be issued in an electronic format. Unless otherwise specified, the electronic format will be Adobe Acrobat® (PDF). Unless otherwise specified by the client, all reports will be complete and follow the standard format outlined above. At a client's request data may also be generated in a spreadsheet format or electronic data deliverable (EDD).

10.3.6 Electronic Signatures

An electronic signature function may be used by project managers, directors, and technical managers for the purpose of signing cover letters or certification pages of a document. The laboratory will use the sign and certify function in Adobe Acrobat® (PDF) to apply electronic signatures. Each user will have a unique password for access to their secured signature.

Once all signatures have been applied, the report is secured, resulting in the client's inability to add the report to standard documents. In cases where the client requires access to report contents, two copies of the report will be issued to the client. The first copy will be secured with an electronic signature and the second copy will be unsecured and without an electronic signature.

10.3.7 Certification Statement Signatures

Certification statements of authenticity and accuracy are often included in the report.

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These statements are signed by authorized individuals upon completion of the report. Before signing, these signatories ensure that, to the best of their knowledge, the data enclosed is complete, accurate, and in conformance with the laboratories quality systems. Authorized signatories for this final statement are the Laboratory Director, Technical Managers, Project Managers, and the Quality Assurance Director. Once this statement has been signed, the report can be secured and sent to the client as finalized.

10.3.8 Report Revisions

In the event that a client requires a revision to be made to a report, a new report will be made that contains the revision number in the document footer or header. The report cover letter or transmittal letter will contain a statement that the report is a revised document and it supercedes the previous report (date issued should be referenced), and the date on which the revised report was issued. Reports issued with a cover page will include the revision number and issue date.

10.4 Client Confidentially

All data generated by EnviroSystems, Incorporated is and remains the property of the client. No officer or staff member of ESI may discuss scopes of testing and results of tests with, or provide any data to, a third party. Data will only be released to a third party when specified by the client and after receipt of a written request from the client.

10.5 State Specific Requirements

Reports for compliance for the State of Massachusetts will include a copy of Massachusetts State Certification for the laboratory performing the work. This will ensure that either ESI or a subcontracted laboratory holds appropriate certification and that the program identification number is part of the report. If the laboratory receives a sample for potable water analysis and the laboratory is not accredited, then it will be sub-contracted to an accredited laboratory. The Chain of Custody sent with the sample must specify the analysis of a potable water sample. If the analysis fails to meet known or communicated state maximum limits, then the client must be notified within 24 hours.

10.6 Report Turnaround Time

It is imperative that turnaround times required by the client are, in turn, met by the laboratory. This is especially apparent when analyzing and reporting regulatory compliance samples that have very severe implications if permit deadlines associated with the testing are not met. It is the laboratory's responsibility to determine realistic turnaround times for a scope of work tied to regulatory compliance. This projection of project deadlines must be clearly described to the client and must be approved by the client through written communication. Additionally, the laboratory is still responsible for regulatory reporting deadlines when samples are subcontracted to another laboratory. In the case of subcontracting such samples, required deadlines must be effectively communicated in written form between the laboratory and subcontractors and must ultimately be agreed upon.

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Figure 10-1. Proper Error Correction

PROPER ERROR CORRECTION

1. SINGLE BLACK LINE THROUGH MISTAKE
2. DATE & INITIAL
3. WRITE ERROR CODE IN CIRCLE, OR EXPLANATION

How to Correct an E r r o r

E1 pks 05/21/12

E1 - Misspelled
E2 - Mathematical Error
E3 - Wrong Entry
E4 - Transposition or Sequencing Error
E5 - Transcription Change (Copy Error)
E6 - Procedural Change
E7 - Wrong Conclusion
E8 - Illegible Entry
E9 - Unnecessary Entry
E10 - Footnoted Explanation
E11 - Additional Comment
E12 - Instrumentation Error/Failure

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11.0 RECORDS MANAGEMENT

Records are the means by which the laboratory documents its operations and activities. They are an integral part of the Quality Assurance program since they provide documented evidence for program functionality, and necessary information for performance evaluation and quality assurance audits. Records are available for review by DoD accrediting body and state authority. The laboratory has procedures to control and review documents that form part of its quality system. Affected personnel are notified of changes to quality system documents and supporting procedures, including technical documents. For more information on quality system components, refer to section 5.0 of this manual.

In order to ensure that files are readily recoverable, file names should include enough detail to identify the record. Reports are filed and stored electronically by their study number. Logbooks are filed and stored electronically by their assigned QA number. All laboratory generated guidance documents and reference documents have a unique identifier and an issue date. These records are updated as needed by supervisors and the QAU. The records are given the next revision and the outdated revisions are archived within their specific directory. Invalid or obsolete documents will be removed from general access and placed into an electronic archive to assure against unintended use.

The laboratory has an established review frequency for all records, such as laboratory notebooks, instrument logbooks, standards logbooks, and records for data reduction, verification, validation and archival. Reviews are scheduled by group supervisors and records of the reviews shall be maintained and made available for review.

11.1 Standard Operating Procedures

Master electronic versions of SOPs will be organized in classified, password secured folders on the network. For control purposes, the most recently approved versions of SOPs will be placed for general access in an electronic folder as a secured PDF document. Original hard copies of each SOP will be maintained by the QAU. Acknowledgment of and adherence to SOP procedures will be documented on forms generated for each staff member, listing all SOPs in the SOP library. These forms are kept in each staff member's training file, and are always available.

When an SOP is superceded or rendered obsolete, the electronic format copy will be archived. The original hard copy of the document will be kept filed with the QAU and retained for a period of 5 years from the generation of the last entry in the record. Electronic copies of the documents in PDF format will be maintained for a minimum of 10 years from the generation of the last entry in the record. For more information on SOPs, see section 6.0 of this Manual.

11.2 Daily Work List

For the analytical laboratory, work lists can be generated by the LIMS system as needed for each analytical parameter. For the toxicology laboratory, a daily work list serves as a master schedule and provides a listing of scheduled activities for the specified date. The work list is generated for each day and lists the status for each ongoing study, daily tasks, maintenance functions, and any additional tasks. When a staff member completes a particular task, they check off and initial the work list for that task. Original initialed work lists are maintained by the laboratory for a minimum of 1 year. Electronic copies of the documents will be maintained for a minimum of 10 years.

11.3 Logbooks and Notebooks

All permanent and bound laboratory notebooks and logbooks must be assigned a QA

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number. The logbook name, QA number, and dates in use must be clearly displayed on the outside of the log. Notebooks and logbooks must be pre-numbered to prevent the removal or addition of pages (electronic logbooks are acceptable). All entries must be initialed, dated and in chronological order. When the activity is completed or carried over to the following page, the logbook or notebook must be closed by the person who performed the last recorded activity; a closure is indicated by date and initials. Additionally, spreadsheets printouts must include all information used to calculate data using properly labeled data and descriptions, where necessary.

11.4 Standards, Solutions, and Reagents Logbooks

Any standard, solution, or reagent generated will be documented using logbooks. Standards preparation is documented using instrument standards logbooks and run logbooks (when utilized). The receipt, preparation of all standards, and dilutions of standards shall be documented. The log will include: the date of preparation, preparer's initials, material source, amount used, final mass or volume, reference number assigned, and expiration date. All standards and their dilutions are clearly labeled with their reference number, name, concentration, date of preparation, and expiration date. Hard copies of standards logbooks will be maintained for a minimum of 1 year. Electronic copies of the documents, in PDF format or other appropriate format, will be maintained for a minimum of 10 years.

11.5 Data Report and Raw Data Package

Completed data reports for all studies are electronically scanned and converted, or directly generated, to PDF format. Hard copies for NPDES permit studies will be maintained for a minimum of 2 months after being provided to the client. Hard copies of other report types and support documentation will be maintained for a minimum of 6 months. Electronic copies of report files will be named using their study number. The scanned files will be stored on a primary file server, designed to maintain system integrity in the event of multiple drive failure.

Hard copies of raw data and reports associated with NPDES permit studies will be maintained for approximately 6 months. Data packages and reports associated with non-NPDES studies are retained for a minimum of 5 years, or as specified by the client. Archived electronic copies of these documents will be maintained for a minimum of 10 years.

11.6 Analytical Records

All support documentation associated with the analysis of chemistry samples and the historical reconstruction of data will be maintained. Information will include:

- 1) Sample ID
- 2) Date / time of sample preparation / analysis
- 3) Analysis method
- 4) Instrument identification and operating conditions or parameters
- 5) Analyst's initials or signature / electronic IDs
- 6) Sample preparation information (cleanup, volumes, incubations, etc.)
- 7) Receipt logs for standards, reagents and supplies
- 8) Any manual integration records
- 9) Calibration check and validation logs
- 10) Results of statistical analysis programs (if applicable)
- 11) Quality control protocols
- 12) Records of modifications to computer software
- 13) Records of alterations of automatically collected data

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- 14) Results of QC performance and acceptance criteria
- 15) Manual calculations
- 16) PT results
- 17) Demonstrations of capabilities
- 18) Record of names, initials, and signatures
- 19) Initials and date of changes

11.7 Data Archival

Logs will be named and assigned a log number by the QAU prior to being issued. When completed, data from logbooks, calibration records and other quality systems records are filed in a locked cabinet maintained by the QAU. Access to secured records are documented with an access log. After being filed, logs may be scanned and converted to electronic format as well. The electronic files will carry the same name as the original hard copy of the document. Copies of all files maintained on the file server are backed up daily at an offsite location to prevent loss of original data.

11.8 Training Records

The Technical Manager is responsible for providing documentation of training and capability. The QAU maintains a training file for each employee. The training file will be independent from other personnel records. Training files will include checklists of basic and advanced laboratory activities, a listing of all SOPs read by the analyst, and copies of reference or proficiency testing data. Training files will also include documentation of initial and annual continuing demonstrations of capability (DOCs). Documentation may include a certification statement and support data. An individual may inspect their training file at any time.

11.9 Equipment Maintenance Records

Logbooks, maintenance records and similar support materials are maintained for major pieces of analytical equipment. These records indicate when maintenance functions are performed and what actions were taken. If the equipment is taken out of service due to poor performance, then the date it is removed and returned (if applicable) is recorded. Equipment maintenance records are maintained for a minimum of 5 years. Electronic copies of documents will be maintained for a minimum of 10 years.

11.10 Return of Data Files

In the event that the Corporation is dissolved, attempts will be made to return all data to the client. In the event that the client is no longer in business, attempts will be made to return the data to the entity that acquired the client. In cases where the work was conducted under a subcontract, attempts will be made to return data to the primary contractor. In a case where no owner can be identified, data files will be destroyed.

11.11 Records Disposal

Once records have exceeded their mandated retention time the documents may be destroyed. In cases where the client has specified they be notified prior to disposal of any project records, they will be notified at this time. Documents to be destroyed will be either shredded or torn and mixed together to minimize recovery. Paper waste will be mixed with all other recyclable paper waste generated by the laboratory.

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12.0 COMPLAINT MANAGEMENT

The term "complaint" is considered a general term and, as specified by Department of Defense laboratory accreditation guidelines, refers to various types of contacts with a client. These can include: questions regarding results, comments related to a particular study or analysis, compliments from a client, and what is traditionally considered a complaint. Complaints will be handled by an experienced staff member and addressed in a timely and responsive manner. The company will track "customer complaints" as a Corrective Action Report (CAR) using a web based tracking system described in SOP QA-1134 and section 5 of this manual. All valid questions, comments, compliments and complaints from a client should generate a CAR. The web based tracking system will automatically notify appropriate staff members when a customer "issue" has been logged, and that efforts to resolve the "issue" may be necessary.

12.1 Client Questions

Questions from clients may be answered by the person contacted by the client, as appropriate. If the person receiving the call or email is unable to answer, or feels that the question is beyond their capabilities, then the call will be passed on to the appropriate staff member. The person receiving the initial call may initiate a CAR depending on the nature of the question. Minor questions, or questions not directly related to projects or performance, may not require a CAR.

12.2 Client Comments

Comments, either general or specific to a project or analysis from a client, will be directed to the appropriate staff member to be addressed. A CAR may be initiated by the person responding to the comment as appropriate.

12.3 Client Compliments

If the company receives a client compliment for ongoing or past work, a CAR should be initiated. The compliment report will be initiated by the person receiving the call or email, or by an appropriate staff member.

12.4 Complaints**12.4.1 Reports and Data**

When a formal client complaint is received concerning data or a generated report, either in writing or verbally, the Laboratory Director and appropriate Technical Manager will be notified as soon as possible and a CAR initiated. All records and supporting data related to the study will be retrieved and reviewed to determine if inaccurate or incorrect data was reported to the client. Associated staff should also be notified of the circumstance.

If the error is confirmed, then a revised final report will be generated and presented to the QAU for review. After review, the revised final report will be issued. An explanation of revised material will be included in the cover letter of the revised report. The report reference number (located on the cover page of the report) is amended to indicate that the report issued is a revision. The revision reference may also be included in the footer of the report. The client will be appraised of the findings and of any steps that will be taken to minimize the likelihood of future errors.

If a review of the data indicates that there were no errors in the data or final report, then the client will be contacted and steps will be taken to ensure that the client understands the data and its interpretation.

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12.4.2 Service

If a client contact includes a reference to an issue with respect to services provided by the laboratory, then a CAR must be initiated. The CAR will be initiated and addressed by the appropriate staff members.

Once a report has been issued for any client, the procedures for follow-up and tracking of the CAR will be those specified in SOP QA-1134. When all actions related to the issue have been addressed, the CAR will be closed. As required, subsequent follow-up of laboratory activities may be scheduled to ensure the issue has been fully addressed.

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13.0 TERMS AND DEFINITIONS

Acceptance Criteria	Specified limits placed on characteristics of an item, process, or service defined in requirement documents.
Accuracy	The degree of agreement between a measured value and the true or expected value.
Aliquot	A measured portion of a sample taken for analysis; also referred to as a "sub-sample".
Alternating Allocation	A method of addition to test chambers ordered so that all replicates are loaded in A, B, C and D order. Within replicate groups the order is alternated between low to high and high to low concentrations.
Analyst	The designated individual who performs the "hands-on" analytical methods and associated techniques and who is the one responsible for applying required laboratory practices and other pertinent quality controls to meet the required level of quality.
Analyte	The specific entity an analysis seeks to determine.
Assay Review Checklist (ARC)	A single document designed to ensure that the data package is complete on a daily basis and all data sheets are reviewed entirely.
B	Data qualifier indicating that a concentration of the target analyte was found in the reagent blank, indicating possible reagent or background contamination.
Audit	A systematic evaluation to determine the conformance to quantitative and qualitative specifications of some operational function or activity.
Batch	A grouping of samples of similar matrix which are extracted and analyzed together with the same method and the same lots of reagents within the same time frame.
Blank	An artificial sample designed to detect and/or monitor the contribution of analyte and non-analyte contamination, instrumental background and sample processing to the measurement system.
Blind Sample	A sample submitted for analysis whose composition is known to the submitter but unknown to the analyst.
Calibration	The process of establishing the relationship between instrument response and known, traceable quantities of analytes of interest.
Certificate of Validity	Reports covering Whole Effluent Toxicity (WET) testing will include a signed statement certifying the validity of the report. This certificate is to be signed by the laboratory and the client.
Certified Reference Material (CRM)	A reference material one or more of whose property values are certified by a technically valid procedure, accompanied by or traceable to a certificate or other documentation which is issued by a certifying body.
Comparability	A qualitative parameter expressing the confidence with which one data set can be compared to another. Comparable data are produced through the use of standardized procedures and techniques.
Completeness	Measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct, normal conditions.

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Continuing Calibration Verification (CCV)	The verification of the initial calibration that is required during the course of analysis at periodic intervals. Continuing calibration verification applies to both external standard and internal standard calibration techniques, as well as to linear and non-linear calibration models.
Control Chart	A graphical plot of test results with respect to time or sequence of measurement, together with limits within which they are expected to lie when the system is in a state of statistical control.
Control Limit	A range within which specified measurement results must fall to signify compliance. Control limits may be mandatory and requiring corrective action if exceeded, or advisory and requiring that nonconforming data be flagged.
Corrective Action	The action taken to eliminate the causes of an existing nonconformity, defect or other undesirable situation in order to prevent recurrence.
Chain of Custody (COC)	A form that accompanies samples during shipment. This record serves to document client information, field collection information, and the transfer of samples.
Demonstration of Capability (DOC)	A procedure to establish the ability of the analyst to generate results by a specific method that meet measurement quality objectives (e.g., for precision and bias). DOCs are performed prior to using any method and when there is a change in: instrument type, personnel or method. DOCs are also performed any time that a method has not been performed by the laboratory or analyst in a year.
Detection Limit	The minimum concentration of a substance that can be measured and reported with 95% confidence that the analyte concentration is greater than zero.
DoD	Department of Defense
Dry Weight	The weight of a sample based on the percent solids. The weight of a sample after complete (dried to constant weight) drying in an oven.
Duplicate Sample	A second aliquot of the same sample that is treated the same as the original sample in order to determine the precision of the method.
Duplicate Analysis	A second measurement made on the same sample extract to assist in the evaluation of precision of analysis.
ELAP	Environmental Laboratory Accreditation Program. Laboratory accreditation program established by the Department of Defense (DoD) and based on ISO 17025 criteria.
Effective Date	The date a document is approved by management and finalized.
False Negative	An analyte incorrectly reported as absent from the sample, resulting in potential risks from their presence.
False Positive	An item incorrectly identified as present in the sample, resulting in a high reporting value for the analyte of concern.
Field Sample	A portion of material received by the laboratory to be analyzed, that is contained in single or multiple containers and identified by a unique field ID number.
Field Blank	A quality control sample used to assess the contamination effects on accuracy due to the combined activities of sampling and analysis. It is composed of a reagent and analyte free matrix (deionized water).

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Holding Time	The elapsed time expressed in days from the date of sample collection by the field personnel until the date of its processing/analysis.
Homogeneity	The degree to which a property or substance is randomly distributed throughout a material.
Initial Calibration Verification (ICV)	Second source calibration verification
In-Life Audit	An on-site inspection or assessment of a particular department's adherence to QA/QC criteria.
Instrument Blank	A clean sample processed through the instrumental steps of the measurement process; used to determine instrument contamination.
Internal Standard	A pure compound of absolute known concentration added to a sample just prior to instrument analysis to permit correction of inefficiencies within the sample matrix.
ISO	International Standards Organization
J	Data qualifier indicating that the reported value is an estimate because the concentration of target analyte is below the reporting limit, or because certain QC criteria were not achieved.
Laboratory Control Sample (LCS)	A quality system matrix, known to be free of analytes of interest, spiked with known concentrations of analytes. The Laboratory Control Sample is used to evaluate the performance of the total analytical system, including all preparation and analysis steps.
Laboratory Control Sample Duplicate (LCSD)	A second quality system matrix, known to be free of analytes of interest, spiked with known concentrations of analytes. The Laboratory Control Sample Duplicate is used to determine precision.
Limit of Detection (LOD)	Estimate of the minimum amount of an analyte in a given matrix that an analytical process can reliably detect in the laboratory.
Limit of Quantitation (LOQ)	The minimum levels, concentrations, or quantities of a target variable, (e.g., target analyte) that can be reported with a specified degree of confidence.
Lot	A quantity of bulk material of similar composition processed or manufactured at the same time.
Matrix	The predominant material of which the sample to be analyzed is composed.
Measurement Quality Objectives (MQOs)	The desired sensitivity, range, precision, and bias of a measurement.
Method Detection Limit (MDL)	The minimum measured concentration of a substance that can be reported with 99% confidence that the measured concentration is distinguishable from method blank results. The MDL value calculated from the spiked samples is referred to as the MDL _s and the MDL value based on method blanks is referred to as MDL _b .
Matrix Spike (MS)	A known mass of target analyte added to a sample or sub-sample; used to determine recovery efficiency or for other quality control purposes.
Matrix Spike Duplicate (MSD)	A known mass of target analyte added to a sample or sub-sample for a second time; used to determine recovery efficiency and precision or for other quality control purposes.

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Negative Control	Measures taken to ensure that a test, its components, or the environment do not cause undesired effects, or produce incorrect test results.
NELAC	National Environmental Laboratory Accreditation Conference, See TNI
NELAP	National Environmental Laboratory Accreditation Program
Preparatory Blank (PB)	An analytical control consisting of all reagents that is carried through the entire analytical procedure. The preparatory blank is used to define the level of laboratory background, contamination, and variation in the associated sample batch.
Performance Evaluation (PE)	A process to evaluate the proficiency of an analyst or laboratory by evaluation of the results obtained on known test materials.
Positive Control	Measures taken to ensure that a test and/or its components are working properly and producing correct or expected results from positive test subjects.
Precision	Reproducibility; the measurement of agreement of a set of replicate results among themselves without any prior information as to the true result. Precision is assessed by means of duplicate/replicate sample analysis.
Proficiency Testing (PT)	A means of evaluating a laboratory's performance under controlled conditions relative to a given set of criteria through analysis of unknown samples provided by an external source.
Preservation	Any conditions under which a sample must be kept in order to maintain chemical and/or biological integrity prior to analysis.
Protocol	A stated plan that clearly defines the objectives, methods and procedures for accomplishing a task; rules under which operations are conducted to meet requirements of regulatory programs. Common protocols include RCRA, NPDES, ACOE, Clean Water Act and the Safe Drinking Water Act.
Quality Control (QC)	A system of checks and behaviors, integrated with the activities that directly generate the product or service, that serves to monitor and adjust the process to maintain conformance to predetermined requirements.
Quality Assurance (QA)	A system of policies and procedures whose purpose is to ensure, confirm and document that the product or service rendered fulfills the requirements of ESI and its client. Quality Assurance includes quality planning, quality control, quality assessment (auditing), quality reporting and corrective action.
Quality Assurance Project Plan (QAPP)	A formal document describing the detailed quality control procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved.
Quality System	A structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required QA and QC.

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Raw Data	Any Original factual information from a measurement activity or study recorded in a laboratory notebook, worksheets, records, memoranda, notes, or exact copies thereof that are necessary for the reconstruction and evaluation of the report of the activity or study. Raw data may include photography, microfilm or microfiche copies, computer printouts, magnetic media, including dictated observations, and recorded data from automated instruments. If exact copies of raw data have been prepared (e.g., tapes which have been transcribed verbatim, data and verified accurate by signature), the exact copy or exact transcript may be submitted.
Reagent Blank (method reagent blank)	A sample consisting of reagent(s), without the target analyte or sample matrix, introduced into the analytical procedure at the appropriate point and carried through all subsequent steps to determine the contribution of the reagents and of the involved analytical steps.
Reference Toxicant	The toxicant used in performing toxicity tests to indicate the sensitivity of a test organism and to demonstrate the laboratory's ability to perform the test correctly and obtain consistent results.
Replicate Sample	A second, separate sample collected at the same time, from the same place, for the same analysis, as the original sample in order to determine overall precision.
Reporting Limit	The lowest value that can be reported while maintaining to meet QC criteria; a responsive value that is the greater of the MDL, lowest calibration value, or lowest value required by the protocol or program.
Rounding Rules	If the figure following those to be retained is less than 5, then the figure is dropped and the retained figures are kept unchanged. As an example, 11.443 is rounded off to 11.44. If the figure following those to be retained is greater than 5, then the figure is dropped and the last retained figure is raised by 1. As an example, 11.446 is rounded off to 11.45. If the figure following those to be retained is 5 and if there are no figures other than zeros beyond the five, then the figure 5 is dropped and the last-place figure retained is increased by 1 if it is an odd number, or it is kept unchanged if an even number. As an example, 11.435 is rounded off to 11.44, while 11.425 is rounded off to 11.42. If a series of multiple operations is to be performed (add, subtract, divide, multiply), all figures are carried through the calculations. The final answer is rounded to the proper number of significant figures.
Sample	In general, a unit of matrix enclosed by a single container (or replicate, interchangeable containers) representing a single location at a unique point in time.
SAP	Sample Analysis Plan
Sensitivity	Capability of methodology or instrumentation to discriminate between samples having differing concentrations or containing differing amounts of an analyte.
Split Sample	A portion or subsample of a total sample obtained in such a manner that is not believed to differ significantly from other portions of the same sample.
SOW	Statement of Work
Standard Operating Procedure (SOP)	A procedure adopted for repetitive use when performing specific measurement or sampling operation. It may be an industry accepted standard method or one developed by the user.
Standard	A substance or material of which the properties are believed to be known with sufficient accuracy to permit its use to evaluate the same property in a sample.

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Standard Reference Material (SRM)	A certified reference material produced by the U.S. National Institute of Standards and Technology or other equivalent organization and characterized for absolute content, independent of analytical method.
Sub-sample	A portion of a sample.
Surrogate	An analyte that is non-target, and that does not interfere with the target analyte, but behaves in a similar manner as the target analyte, that is added to a sample to observe its recovery. The surrogate monitors the efficacy of the analysis on the sample matrix.
Systems Audit	An on-site inspection or assessment of the laboratory's quality control system.
Target Analytes	Analytes specifically named by a client (also called project-specific analytes).
Test	A technical operation that consists of the determination of one or more characteristics or performance of a given product, material, equipment, organism, physical phenomenon, process or service according to a specified procedure. The result of a test is normally recorded in a document sometimes called a test report or a test certificate.
Test Method	An adoption of a scientific technique for performing a specific measurement as documented in a laboratory SOP or as published by a recognized authority.
TNI	The NELAC Institute, US national laboratory accreditation group. Accredits laboratories under the National Laboratory Accreditation Program
Traceability	The ability to trace the source and accuracy of a material (i.e., standard) to a recognized primary reference source such as the National Institute of Standards and Technology (NIST) or USEPA. Also, the ability to independently reconstruct and review all aspects of the measurement system through available laboratory notebooks and documentation and reach the same results.
Trip Blank	This blank is used to detect sample contamination from the container and preservative during transport and storage of the sample. A cleaned sample container is filled with laboratory pure water; any preservative used in the sample is added; the blank is stored, shipped, and analyzed with its group of samples.
Triplicate Sample	A third aliquot of the same sample that is treated the same as the original sample in order to determine the precision of the method.
Validation	The process by which a sample, measurement, method, or piece of data is determined to be usable for a specified purpose.
Verification	Confirmation by examination and provision of evidence that specified requirements have been met.
Warning Limits	The limits (typically 2 standard deviations) shown on a control chart within which most results are expected to lie (within a 95% probability) while the system remains in a state of statistical control.

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Certification Description	Total Number of Pages
Department of Defense Laboratory Accreditation Certificate and Parameter List	12
State of Connecticut Laboratory Accreditation Certificate and Parameter List	11
State of Maine Laboratory Accreditation Certificate and Parameter List	5
State of Massachusetts Laboratory Accreditation Certificate and Parameter List	2
State of New Hampshire Laboratory Accreditation Certificate and Parameter List	8
State of Rhode Island Laboratory Accreditation Certificate	1



CERTIFICATE OF ACCREDITATION

ANSI-ASQ National Accreditation Board

500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

Envirosystems, Inc.
1 Lafayette Rd.
Hampton, NH 03842

has been assessed by ANAB
and meets the requirements of international standard

ISO/IEC 17025:2005

**and DoD Quality Systems Manual for Environmental
Laboratories (DoD QSM V 5.1.1)**

while demonstrating technical competence in the fields of

TESTING

Refer to the accompanying Scope of Accreditation for information regarding the types of calibrations and/or tests to which this accreditation applies.

L2340
Certificate Number


ANAB Approval

Certificate Valid: 09/28/2018-11/28/2021
Version No. 002 Issued: 09/28/2018



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005 AND DOD QUALITY SYSTEMS MAUAL FOR ENVIRONMENTAL LABORATORIES (DOD QSM V 5.1.1)

EnviroSystems, Inc

1 Lafayette Rd.
Hampton, NH 03842
Andrew Moore
603-926-3345

TESTING

Valid to: **November 28, 2021**Certificate Number: **L2340**

Environmental

Non-Potable Water		
Technology	Method	Analyte
ICP-MS	EPA 200.8	Aluminum
ICP-MS	EPA 200.8	Antimony
ICP-MS	EPA 200.8	Arsenic
ICP-MS	EPA 200.8	Barium
ICP-MS	EPA 200.8	Beryllium
ICP-MS	EPA 200.8	Boron
ICP-MS	EPA 200.8	Cadmium
ICP-MS	EPA 200.8	Calcium
ICP-MS	EPA 200.8	Chromium
ICP-MS	EPA 200.8	Cobalt
ICP-MS	EPA 200.8	Copper
ICP-MS	EPA 200.8	Iron
ICP-MS	EPA 200.8	Lead
ICP-MS	EPA 200.8	Magnesium
ICP-MS	EPA 200.8	Manganese
ICP-MS	EPA 200.8	Molybdenum
ICP-MS	EPA 200.8	Nickel
ICP-MS	EPA 200.8	Potassium
ICP-MS	EPA 200.8	Selenium
ICP-MS	EPA 200.8	Silver

Non-Potable Water		
Technology	Method	Analyte
ICP-MS	EPA 200.8	Sodium
ICP-MS	EPA 200.8	Thallium
ICP-MS	EPA 200.8	Vanadium
ICP-MS	EPA 200.8	Zinc
CVAf	EPA 245.7	Mercury
Colorimetric	SM-3500 Cr-B	Hexavalent Chromium
Colorimetric	EPA 310.2	Alkalinity
Gravimetric	EPA 1664A (HEM)	Oil and Grease
Gravimetric	EPA 1664A (SGT-HEM)	Mineral Oil and Grease
Colorimetric	SM-4500 NH3 G	Ammonia
Colorimetric	SM-4500 NH3 G	Total Kjeldahl Nitrogen
Gravimetric	SM 2540 B	Residue, total (TS)
Gravimetric	SM 2540 C	Residue, filterable (TSS)
Gravimetric	SM 2540 D	Residue, non-filterable (TDS)
Ion Chromatography	EPA 300.0	Chloride
Distillation/Colorimetric	SM 4500 CN E	Total Cyanide
Colorimetric	SM 4500 NO3 F	Nitrate-Nitrite
Colorimetric	SM 4500 P E	Orthophosphate as P
Digestion/Colorimetric	SM 4500 P	Total Phosphorus
Empirical	SM 5210 B	Biological Oxygen Demand
Empirical	SM 5210 B	Carbonaceous Oxygen Demand
Titration	SM 5220 C	Chemical Oxygen Demand
Combustion/IR	SM 5310 C	Total Organic Carbon
Ion Chromatography	EPA 300.0	Sulfate
GC-ECD	EPA 8082A	Aroclor 1016
GC-ECD	EPA 8082A	Aroclor 1221
GC-ECD	EPA 8082A	Aroclor 1232
GC-ECD	EPA 8082A	Aroclor 1242
GC-ECD	EPA 8082A	Aroclor 1248
GC-ECD	EPA 8082A	Aroclor 1254
GC-ECD	EPA 8082A	Aroclor 1260
GC-Mass Spectrometer	EPA 680 modified (SIM)	PCB Congeners
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,4'-dichlorobiphenyl (PCB 8)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',5-trichlorobiphenyl (PCB 18)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,4,4'-trichlorobiphenyl (PCB 28)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,5'-tetrachlorobiphenyl (PCB 44)

Non-Potable Water		
Technology	Method	Analyte
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',4,5'-tetrachlorobiphenyl (PCB 49)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',5,5'-tetrachlorobiphenyl (PCB 52)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,3',4,4'-tetrachlorobiphenyl (PCB 66)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,4,5'-pentachlorobiphenyl (PCB 87)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',4,5,5'-pentachlorobiphenyl (PCB 101)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,3,3',4,4'-pentachlorobiphenyl (PCB 105)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,3',4,4',5-pentachlorobiphenyl (PCB 118)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,3',4,4'-hexachlorobiphenyl (PCB 128)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',4,4',5,5'-hexachlorobiphenyl (PCB 153)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,3',4,4',5-heptachlorobiphenyl (PCB 170)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB 180)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,4,4',5',6-heptachlorobiphenyl (PCB 183)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,4,4',6,6'-heptachlorobiphenyl (PCB 184)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,4',5,5',6-heptachlorobiphenyl (PCB 187)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,3',4,4',5,6-octachlorobiphenyl (PCB 195)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,3',4,4',5,5',6-nonachlorobiphenyl (PCB 206)
GC-Mass Spectrometer	EPA 680 modified (SIM)	Decachlorobiphenyl (PCB 209)
GC-Mass Spectrometer	EPA 680 modified (SIM)	Pentachlorophenol
GC-ECD	EPA 8081	Pesticides
GC-ECD	EPA 8081	Hexachlorobenzene
GC-ECD	EPA 8081	Alpha-BHC
GC-ECD	EPA 8081	Gamma-BHC (Lindane)
GC-ECD	EPA 8081	Beta-BHC
GC-ECD	EPA 8081	Delta-bhc
GC-ECD	EPA 8081	Heptachlor
GC-ECD	EPA 8081	Aldrin
GC-ECD	EPA 8081	Oxychlordane
GC-ECD	EPA 8081	Chlorpyrifos
GC-ECD	EPA 8081	Heptachlor Epoxide
GC-ECD	EPA 8081	Gamma-chlordane
GC-ECD	EPA 8081	Trans-nonachlor
GC-ECD	EPA 8081	Alpha-chlordane
GC-ECD	EPA 8081	Endosulfan I
GC-ECD	EPA 8081	4,4'-DDE
GC-ECD	EPA 8081	Dieldrin
GC-ECD	EPA 8081	Endrin

Non-Potable Water		
Technology	Method	Analyte
GC-ECD	EPA 8081	Cis-nonachlor
GC-ECD	EPA 8081	4,4'-DDD
GC-ECD	EPA 8081	Endosulfan II
GC-ECD	EPA 8081	Toxaphene
GC-ECD	EPA 8081	4,4'-DDT
GC-ECD	EPA 8081	Endrin Aldehyde
GC-ECD	EPA 8081	Endosulfan Sulfate
GC-ECD	EPA 8081	Methoxychlor
GC-ECD	EPA 8081	Endrin Ketone
Preparation	Method	Type
Acid Digestion	EPA 200.8	Acid Digestion
Liquid Extraction	EPA 3510C	Liquid-Liquid Extraction
Cleanup	EPA 3620C	Florisil Cleanup
Cleanup	EPA 3630C	Silica Gel Cleanup
Cleanup	EPA 3660B	Sulfur Cleanup
Cleanup	EPA 3665A	Sulfuric Acid/Permanganate Cleanup

Drinking Water		
Technology	Method	Analyte
ICP-MS	EPA 200.8	Aluminum
ICP-MS	EPA 200.8	Antimony
ICP-MS	EPA 200.8	Arsenic
ICP-MS	EPA 200.8	Barium
ICP-MS	EPA 200.8	Beryllium
ICP-MS	EPA 200.8	Boron
ICP-MS	EPA 200.8	Cadmium
ICP-MS	EPA 200.8	Chromium
ICP-MS	EPA 200.8	Cobalt
ICP-MS	EPA 200.8	Copper
ICP-MS	EPA 200.8	Iron
ICP-MS	EPA 200.8	Lead
ICP-MS	EPA 200.8	Manganese
ICP-MS	EPA 200.8	Molybdenum
ICP-MS	EPA 200.8	Nickel
ICP-MS	EPA 200.8	Selenium

Drinking Water

Technology	Method	Analyte
ICP-MS	EPA 200.8	Silver
ICP-MS	EPA 200.8	Thallium
ICP-MS	EPA 200.8	Vanadium
ICP-MS	EPA 200.8	Zinc

Solid and Chemical Materials

Technology	Method	Analyte
ICP-MS	EPA 6020B	Aluminum
ICP-MS	EPA 6020B	Antimony
ICP-MS	EPA 6020B	Arsenic
ICP-MS	EPA 6020B	Barium
ICP-MS	EPA 6020B	Beryllium
ICP-MS	EPA 6020B	Boron
ICP-MS	EPA 6020B	Cadmium
ICP-MS	EPA 6020B	Calcium
ICP-MS	EPA 6020B	Chromium
ICP-MS	EPA 6020B	Cobalt
ICP-MS	EPA 6020B	Copper
ICP-MS	EPA 6020B	Iron
ICP-MS	EPA 6020B	Lead
ICP-MS	EPA 6020B	Magnesium
ICP-MS	EPA 6020B	Manganese
ICP-MS	EPA 6020B	Molybdenum
ICP-MS	EPA 6020B	Nickel
ICP-MS	EPA 6020B	Potassium
ICP-MS	EPA 6020B	Selenium
ICP-MS	EPA 6020B	Silver
ICP-MS	EPA 6020B	Sodium
ICP-MS	EPA 6020B	Thallium
ICP-MS	EPA 6020B	Vanadium
ICP-MS	EPA 6020B	Zinc
CVAF	EPA 245.7	Mercury
GC-ECD	EPA 8082A	Aroclor 1016
GC-ECD	EPA 8082A	Aroclor 1221
GC-ECD	EPA 8082A	Aroclor 1232

Solid and Chemical Materials		
Technology	Method	Analyte
GC-ECD	EPA 8082A	Aroclor 1242
GC-ECD	EPA 8082A	Aroclor 1248
GC-ECD	EPA 8082A	Aroclor 1254
GC-ECD	EPA 8082A	Aroclor 1260
GC-Mass Spectrometer	EPA 680 modified (SIM)	PCB Congeners
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,4'-dichlorobiphenyl (PCB 8)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',5-trichlorobiphenyl (PCB 18)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,4,4'-trichlorobiphenyl (PCB 28)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,5'-tetrachlorobiphenyl (PCB 44)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',4,5'-tetrachlorobiphenyl (PCB 49)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',5,5'-tetrachlorobiphenyl (PCB 52)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,3',4,4'-tetrachlorobiphenyl (PCB 66)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,4,5'-pentachlorobiphenyl (PCB 87)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',4,5,5'-pentachlorobiphenyl (PCB 101)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,3,3',4,4'-pentachlorobiphenyl (PCB 105)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,3',4,4',5-pentachlorobiphenyl (PCB 118)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,3',4,4'-hexachlorobiphenyl (PCB 128)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',4,4',5,5'-hexachlorobiphenyl (PCB 153)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,3',4,4',5-heptachlorobiphenyl (PCB 170)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB 180)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,4,4',5',6-heptachlorobiphenyl (PCB 183)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,4,4',6,6'-heptachlorobiphenyl (PCB 184)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,4',5,5',6-heptachlorobiphenyl (PCB 187)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,3',4,4',5,6-octachlorobiphenyl (PCB 195)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,3',4,4',5,5',6-nonachlorobiphenyl (PCB 206)
GC-Mass Spectrometer	EPA 680 modified (SIM)	Decachlorobiphenyl (PCB 209)
Combustion/IR	EPA 9060	Total Organic Carbon
GC-ECD	EPA 8081	Pesticides
GC-ECD	EPA 8081	Hexachlorobenzene
GC-ECD	EPA 8081	Alpha-BHC
GC-ECD	EPA 8081	Gamma-BHC (Lindane)
GC-ECD	EPA 8081	Beta-BHC
GC-ECD	EPA 8081	Delta-bhc
GC-ECD	EPA 8081	Heptachlor
GC-ECD	EPA 8081	Aldrin
GC-ECD	EPA 8081	Oxychlorane

Solid and Chemical Materials		
Technology	Method	Analyte
GC-ECD	EPA 8081	Chlorpyrifos
GC-ECD	EPA 8081	Heptachlor Epoxide
GC-ECD	EPA 8081	Gamma-chlordane
GC-ECD	EPA 8081	Trans-nonachlor
GC-ECD	EPA 8081	Alpha-chlordane
GC-ECD	EPA 8081	Endosulfan I
GC-ECD	EPA 8081	4,4'-DDE
GC-ECD	EPA 8081	Dieldrin
GC-ECD	EPA 8081	Endrin
GC-ECD	EPA 8081	Cis-nonachlor
GC-ECD	EPA 8081	4,4'-DDD
GC-ECD	EPA 8081	Endosulfan II
GC-ECD	EPA 8081	Toxaphene
GC-ECD	EPA 8081	4,4'-DDT
GC-ECD	EPA 8081	Endrin Aldehyde
GC-ECD	EPA 8081	Endosulfan Sulfate
GC-ECD	EPA 8081	Methoxychlor
GC-ECD	EPA 8081	Endrin Ketone
GC-Mass Spectrometer	EPA 8270 (SIM)	Napthalene
GC-Mass Spectrometer	EPA 8270 (SIM)	Acenaphthylene
GC-Mass Spectrometer	EPA 8270 (SIM)	Acenaphthene
GC-Mass Spectrometer	EPA 8270 (SIM)	Fluorene
GC-Mass Spectrometer	EPA 8270 (SIM)	Phenanthrene
GC-Mass Spectrometer	EPA 8270 (SIM)	Anthracene
GC-Mass Spectrometer	EPA 8270 (SIM)	Fluoranthene
GC-Mass Spectrometer	EPA 8270 (SIM)	Pyrene
GC-Mass Spectrometer	EPA 8270 (SIM)	Benzo[a]anthracene
GC-Mass Spectrometer	EPA 8270 (SIM)	Chrysene
GC-Mass Spectrometer	EPA 8270 (SIM)	Benzo[b]fluoranthene
GC-Mass Spectrometer	EPA 8270 (SIM)	Benzo[k]fluoranthene
GC-Mass Spectrometer	EPA 8270 (SIM)	Benzo[a]pyrene
GC-Mass Spectrometer	EPA 8270 (SIM)	Indeno[1,2,3-cd]pyrene
GC-Mass Spectrometer	EPA 8270 (SIM)	Dibenz[a,h]anthracene
GC-Mass Spectrometer	EPA 8270 (SIM)	Benzo[g,h,i]perylene
Preparation	Method	Type
Acid Digestion	EPA 3050B	AcidDigestion

Solid and Chemical Materials

Technology	Method	Analyte
Solid Extraction	EPA 3570 MOD	Microscale Solvent Extraction
Cleanup	EPA 3620C	Florisil Cleanup
Cleanup	EPA 3630C	Silica Gel Cleanup
Cleanup	EPA 3660B	Sulfur Cleanup
Cleanup	EPA 3665A	Sulfuric Acid/Permanganate Cleanup

Biological Tissue

Technology	Method	Analyte
ICP-MS	EPA 6020B	Aluminum
ICP-MS	EPA 6020B	Antimony
ICP-MS	EPA 6020B	Arsenic
ICP-MS	EPA 6020B	Barium
ICP-MS	EPA 6020B	Beryllium
ICP-MS	EPA 6020B	Boron
ICP-MS	EPA 6020B	Cadmium
ICP-MS	EPA 6020B	Calcium
ICP-MS	EPA 6020B	Chromium
ICP-MS	EPA 6020B	Cobalt
ICP-MS	EPA 6020B	Copper
ICP-MS	EPA 6020B	Iron
ICP-MS	EPA 6020B	Lead
ICP-MS	EPA 6020B	Magnesium
ICP-MS	EPA 6020B	Manganese
ICP-MS	EPA 6020B	Molybdenum
ICP-MS	EPA 6020B	Nickel
ICP-MS	EPA 6020B	Potassium
ICP-MS	EPA 6020B	Selenium
ICP-MS	EPA 6020B	Silver
ICP-MS	EPA 6020B	Sodium
ICP-MS	EPA 6020B	Thallium
ICP-MS	EPA 6020B	Vanadium
ICP-MS	EPA 6020B	Zinc
CVAF	EPA 245.7	Mercury
GC-ECD	EPA 8082A	Aroclor 1016
GC-ECD	EPA 8082A	Aroclor 1221
GC-ECD	EPA 8082A	Aroclor 1232

Biological Tissue		
Technology	Method	Analyte
GC-ECD	EPA 8082A	Aroclor 1242
GC-ECD	EPA 8082A	Aroclor 1248
GC-ECD	EPA 8082A	Aroclor 1254
GC-ECD	EPA 8082A	Aroclor 1260
GC-ECD	EPA 8081	Pesticides
GC-ECD	EPA 8081	Hexachlorobenzene
GC-ECD	EPA 8081	Alpha-BHC
GC-ECD	EPA 8081	Gamma-BHC (Lindane)
GC-ECD	EPA 8081	Beta-BHC
GC-ECD	EPA 8081	Delta-bhc
GC-ECD	EPA 8081	Heptachlor
GC-ECD	EPA 8081	Aldrin
GC-ECD	EPA 8081	Oxychlorthane
GC-ECD	EPA 8081	Chlorpyrifos
GC-ECD	EPA 8081	Heptachlor Epoxide
GC-ECD	EPA 8081	Gamma-chlordane
GC-ECD	EPA 8081	Trans-nonachlor
GC-ECD	EPA 8081	Alpha-chlordane
GC-ECD	EPA 8081	Endosulfan I
GC-ECD	EPA 8081	4,4'-DDE
GC-ECD	EPA 8081	Dieldrin
GC-ECD	EPA 8081	Endrin
GC-ECD	EPA 8081	Cis-nonachlor
GC-ECD	EPA 8081	4,4'-DDD
GC-ECD	EPA 8081	Endosulfan II
GC-ECD	EPA 8081	Toxaphene
GC-ECD	EPA 8081	4,4'-DDT
GC-ECD	EPA 8081	Endrin Aldehyde
GC-ECD	EPA 8081	Endosulfan Sulfate
GC-ECD	EPA 8081	Methoxychlor
GC-ECD	EPA 8081	Endrin Ketone
GC-Mass Spectrometer	EPA 680 modified (SIM)	PCB Congeners
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,4'-dichlorobiphenyl (PCB 8)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',5-trichlorobiphenyl (PCB 18)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,4,4'-trichlorobiphenyl (PCB 28)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,5'-tetrachlorobiphenyl (PCB 44)

Biological Tissue		
Technology	Method	Analyte
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',4,5'-tetrachlorobiphenyl (PCB 49)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',5,5'-tetrachlorobiphenyl (PCB 52)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,3',4,4'-tetrachlorobiphenyl (PCB 66)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,4,5'-pentachlorobiphenyl (PCB 87)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',4,5,5'-pentachlorobiphenyl (PCB 101)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,3,3',4,4'-pentachlorobiphenyl (PCB 105)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,3',4,4',5-pentachlorobiphenyl (PCB 118)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,3',4,4'-hexachlorobiphenyl (PCB 128)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',4,4',5,5'-hexachlorobiphenyl (PCB 153)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,3',4,4',5-heptachlorobiphenyl (PCB 170)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,4,4',5,5'-heptachlorobiphenyl (PCB 180)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,4,4',5',6-heptachlorobiphenyl (PCB 183)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,4,4',6,6'-heptachlorobiphenyl (PCB 184)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,4',5,5',6-heptachlorobiphenyl (PCB 187)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,3',4,4',5,6-octachlorobiphenyl (PCB 195)
GC-Mass Spectrometer	EPA 680 modified (SIM)	2,2',3,3',4,4',5,5',6-nonachlorobiphenyl (PCB 206)
GC-Mass Spectrometer	EPA 680 modified (SIM)	Decachlorobiphenyl (PCB 209)
Preparation	Method	Type
Acid Digestion	EPA 3050B	Acid Digestion
Tissue Extraction	EPA 3570 MOD	Microscale Solvent Extraction
Cleanup	EPA 3620C	Florisil Cleanup
Cleanup	EPA 3630C	Silica Gel Cleanup
Cleanup	EPA 3660B	Sulfur Cleanup
Cleanup	EPA 3665A	Sulfuric Acid/Permanganate Cleanup

Toxicology- Whole Effluent Testing		
Technology	Method	Analyte
Bioassay	EPA-821-R-02-013, Method 1000	Fathead Minnow Larval Survival & Growth, Chronic Assay
Bioassay	EPA-821-R-02-013, Method 1002	Ceriodaphnia dubia Survival & Reproduction, Chronic Assay
Bioassay	EPA-821-R-02-014, Method 1007	Mysidopsis bahia Survival, Growth, & Fecundity, Chronic Assay
Bioassay	EPA-821-R-02-014, Method 1005	Sheepshead Minnow Larval Survival & Growth, Chronic Assay

Toxicology- Whole Effluent Testing		
Technology	Method	Analyte
Bioassay	EPA-821-R-02-014, Method 1008	Arbacia punctulata Sperm Immobilization, Chronic Assay
Bioassay	EPA-821-R-02-014, Method 1006	Menidia beryllina Larval Survival & Growth, Chronic Assay
Bioassay	EPA-821-R-02-012, Method 2000	Fathead Minnow, Acute Assay
Bioassay	EPA-821-R-02-012, Method 2002	Ceriodaphnia dubia, Acute Assay
Bioassay	EPA-821-R-02-012, Method 2021	Daphnia pulex, Acute Assay
Bioassay	EPA-821-R-02-012, Method 2007	Americamysis bahia, Acute Assay
Bioassay	EPA-821-R-02-012, Method 2006	Menidia beryllina, Acute Assay
Bioassay	EPA-821-R-02-012, Method 2004	Cyprinodon variegatus, Acute Assay

Toxicology – Sediment and Soil		
Technology	Method	Analyte
Bioassay	ASTM E 1706 EPA 600-R-99-064, Method 100.1	Fresh Water Amphipod 10-day Acute Exposure Assay (eg. Hyalella azteca)
Bioassay	ASTM E 1706 EPA 600-R-99-064, Method 100.2	Freshwater Midge Larvae 10-day Acute Exposure Assay (eg. Chironomus dilutus)
Bioassay	EPA 600-R-99-064, Method 100.3	Lumbriculus variegatus 28-day Bioaccumulation Assay
Bioassay	EPA 600-R-99-064, Method 100.4	Fresh Water Amphipod 28/42-day Chronic Exposure Assay (eg. Hyalella azteca)
Bioassay	ASTM E 1706 EPA 600-R-99-064, Method 100.5	Freshwater Midge Larvae Life Cycle Chronic Exposure Assay with 20 day endpoint (eg. Chironomus dilutus)
Bioassay	ASTM E 1367 EPA 600/R-01/020	Estuarine/Marine Amphipod 10-day Chronic Exposure Assay (eg. Leptocheirus plumulosus)
Bioassay	EPA 600/R-01/020	Estuarine/Marine Amphipod 28-day Chronic Exposure Assay (eg. Leptocheirus plumulosus)
Bioassay	ASTM E 1563	Echinoderm Embryo Acute Exposure Assay (eg. Arbacia punctulata)
Bioassay	ASTM E 1611	Marine Polychaete Sediment Toxicity Test (Neanthes arenaceodentata)

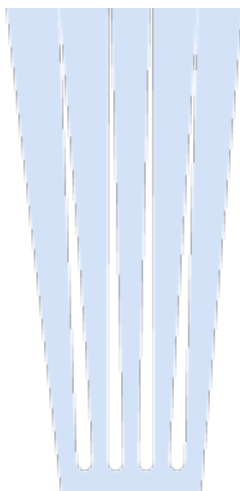
Toxicology – Sediment and Soil		
Technology	Method	Analyte
Bioassay	ASTM E 1688	Benthic Invertebrate Bioaccumulation Evaluation (eg. Nereis virens, Macoma nasuta, Eiseia fetida, Lumbriculus variegatus, Leptocheirus plumulosus, Hyalella azteca)
Bioassay	EPA 823-B-98-004	Acute Exposure, 10-day, Marine Sediment Evaluation (eg. Leptocheirus plumulosus, Ampelisca abdita)
Bioassay	EPA 823-B-98-004	Acute Exposure Water Column, Suspended Particulate Phase, Invertebrate Assays
Bioassay	EPA 823-B-98-004	Benthic Invertebrate Bioaccumulation Evaluation (eg. Nereis virens, Macoma nasuta)
Bioassay	ASTM E 1963	Terrestrial Plant Acute and Chronic Exposure Toxicity Testing (eg. Brassica rapa, Lolium perenne, Lactuca sativa, Trifolium pratense and Lemna minor.)
Bioassay	ASTM E 1676	Soil toxicity or bioaccumulation test with earthworms (eg. Eisenia fetida)

Note:

1. This scope is formatted as part of a single document including Certificate of Accreditation No. L2340



Vice President



State of Connecticut, Department of Public Health

Approved Environmental Laboratory

THIS IS TO CERTIFY THAT THE LABORATORY DESCRIBED BELOW HAS BEEN APPROVED BY THE STATE DEPARTMENT OF PUBLIC HEALTH PURSUANT TO APPLICABLE PROVISIONS OF THE PUBLIC HEALTH CODE AND GENERAL STATUTES OF CONNECTICUT, FOR MAKING THE EXAMINATIONS, DETERMINATIONS OR TESTS SPECIFIED BELOW WHICH HAVE BEEN AUTHORIZED IN WRITING BY THAT DEPARTMENT.

EnviroSystems div. of Enthalpy Analytical, LLC

LOCATED AT 1 Lafayette Road IN Hampton, NH 03842
AND REGISTERED IN THE NAME OF Petra K. Simon

Jason Hobbs

THIS CERTIFICATE IS ISSUED IN THE NAME OF Lisa Francisco (Microbiology) WHO HAS BEEN DESIGNATED
BY THE REGISTERED OWNER / AUTHORIZED AGENT TO BE IN CHARGE OF THE LABORATORY WORK COVERED BY THIS CERTIFICATE OF
APPROVAL AS FOLLOWS:

DRINKING WATER, NON-POTABLE WATER/WASTEWATER, SOLID WASTE/SOILS, BIOLOGICAL TISSUE

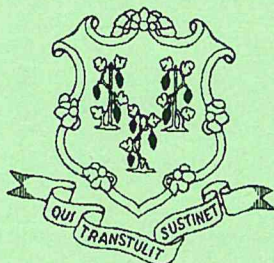
Examination for:
MICRBIOLOGICALS
INORGANIC CHEMICALS
ORGANIC CHEMICALS

SEE COMPUTER PRINT-OUT FOR SPECIFIC TESTS APPROVED

EFFECTIVE RENEWAL DATE October 1, 2017

THIS CERTIFICATE EXPIRES September 30, 2019 AND IS REVOCABLE FOR CAUSE BY THE STATE DEPARTMENT OF PUBLIC HEALTH

DATED AT HARTFORD, CONNECTICUT, THIS 30th DAY OF October, 2018



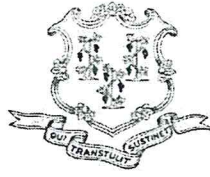
Registration No.

PH-0114

SUZANNE BLANCAFLOR, MS, MPH
CHIEF, ENVIRONMENTAL HEALTH SECTION

STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC HEALTH



Raul Pino, M.D., M.P.H.
Commissioner

Dannel P. Malloy
Governor
Nancy Wyman
Lt. Governor

Facility Licensing & Investigation Section

TO : Jason Hobbs, Director
EnviroSystems div. of Enthalpy Analytical, LLC (PH-0114)
P.O Box 778
Hampton, NH 03843-0778

FROM : Dermot Jones
Environmental Laboratory Consultant/Certification Officer

DATE : November 9, 2018

SUBJECT : Approval as Director of an Environmental Laboratory

A handwritten signature in blue ink, likely belonging to Dermot Jones, the Environmental Laboratory Consultant/Certification Officer.

This is to document that you meet the environmental laboratory director requirements as set forth in Section 19a-36-A62 of the Connecticut Public Health Code. The need for specific education and work experience may limit your certification to certain types of testing.

Your approval includes the following general testing categories:

Inorganic Chemistry
Organic Chemistry

Please contact the Environmental Laboratory Certification Program office (860) 509-7389 if you have any questions concerning your approval.



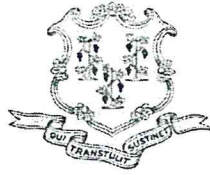
Phone: (860) 509-7389 • Fax: (860) 509-7295 • VP: (860) 899-1611
Telecommunications Relay Service 7-1-1
410 Capitol Avenue, P.O. Box 340308
Hartford, Connecticut 06134-0308
www.ct.gov/dph

Affirmative Action/Equal Opportunity Employer



STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC HEALTH



Raul Pino, M.D., M.P.H.
Commissioner

Dannel P. Malloy
Governor
Nancy Wyman
Lt. Governor

Facility Licensing & Investigation Section

TO: Lisa Francisco, Director
EnviroSystems div. of Enthalpy Analytical, LLC (PH-0114)
P.O Box 778
Hampton, NH 03843-0778

FROM: Dermot Jones
Environmental Laboratory Consultant/Certification Officer

DATE: November 9, 2018

SUBJECT: Approval as Director of an Environmental Laboratory

A handwritten signature in blue ink, appearing to be "DJ", is written over the "FROM:" field.

This is to document that you meet the environmental laboratory director requirements as set forth in Section 19a-36-A62 of the Connecticut Public Health Code. The need for specific education and work experience may limit your certification to certain types of testing.

Your approval includes the following general testing categories:

Microbiologicals

Please contact the Environmental Laboratory Certification Program office (860) 509-7389 if you have any questions concerning your approval.



Phone: (860) 509-7389 • Fax: (860) 509-7295 • VP: (860) 899-1611
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**STATE OF CONNECTICUT****DEPARTMENT OF PUBLIC HEALTH
ENVIRONMENTAL HEALTH SECTION****ENVIRONMENTAL LABORATORY CERTIFICATION PROGRAM
CERTIFIED ANALYTES REPORT FOR ALL MATRICES****EnviroSystems div. of Enthalpy Analytical, LLC****1 LAFAYETTE ROAD
HAMPTON, NH 03842****CT REGISTRATION NUMBER :** **PH-0114****REGISTERED OWNER / AUTHORIZED AGENT :** **Petra K. Simon****DIRECTOR :** **Jason Hobbs****CO DIRECTOR(S) :** **Lisa Francisco****PHONE :** **(603) 926-3345****LABORATORY REGISTRATION EFFECTIVE DATE :** **10/01/2017****LABORATORY REGISTRATION EXPIRATION DATE :** **09/30/2019****LABORATORY STATUS :** **APPROVED****APPROVED BY****SUZANNE BLANCAFLOR, MS, MPH
CHIEF, ENVIRONMENTAL HEALTH SECTION****REVIEWED BY****10/31/2018 3:56:13 PM****DERMOT JONES****ANY QUESTIONS CONCERNING THIS DOCUMENT SHOULD BE ADDRESSED TO THE
ENVIRONMENTAL LABORATORY CERTIFICATION PROGRAM AT (860) 509-7389**

ANIMAL TISSUES

STATUS REPORTED ON 10/31/2018

ANALYTE NAME

METALS

ARSENIC	CADMIUM
CHROMIUM	LEAD
MERCURY	NICKEL
SELENIUM	ZINC

PESTICIDES/ PCB'S

CHLORDANE (TECHNICAL)	ORGANOCHLORINE PESTICIDES (Single Response)
POLYCHLORINATED BIPHENYLS	TOXAPHENE

DRINKING WATER (SDWA)

STATUS REPORTED ON 10/31/2018

ANALYTE NAME**METALS**

ALUMINUM	ANTIMONY
ARSENIC	BARIUM
BERYLLIUM	BORON
CADMIUM	CHROMIUM
COBALT	COPPER
IRON	LEAD
MANGANESE	MOLYBDENUM
NICKEL	SELENIUM
SILVER	THALLIUM
VANADIUM	ZINC

VOLATILE ORGANICSVOLATILE ORGANICS - 524.2 (regulated VOCs
only)

NON-POTABLE WATER/ WASTEWATER (CWA)

STATUS REPORTED ON 10/31/2018

ANALYTE NAME**MICROBIOLOGY/BACTERIA**

FECAL COLIFORM - MF m-FC (SM9222D)

PHYSICALS

CONDUCTIVITY

pH

MINERALS

ALKALINITY

CHLORIDE

SULFATE

NUTRIENTS

AMMONIA

KJELDAHL NITROGEN

NITRATE

NITRITE

O-PHOSPHATE

TOTAL PHOSPHOROUS

METALS

ALUMINUM

ANTIMONY

ARSENIC

BARIUM

BERYLLIUM

BORON

CADMIUM

CALCIUM

CHROMIUM

CHROMIUM - Hexavalent

COBALT

COPPER

IRON

LEAD

MAGNESIUM

MANGANESE

MERCURY

MOLYBDENUM

NICKEL

POTASSIUM

SELENIUM

SILVER

SODIUM

THALLIUM

VANADIUM

ZINC

RESIDUE

TOTAL DISSOLVED SOLIDS

TOTAL RESIDUE (SOLIDS)

TOTAL SUSPENDED SOLIDS

DEMANDS

BOD

CARBONACEOUS BOD

COD

TOTAL ORGANIC CARBON

MISCELLANEOUS

CYANIDE (TOTAL)

PESTICIDES/ PCB'S

CHLORDANE (TECHNICAL)

ORGANOCHLORINE PESTICIDES (Single
Response)

POLYCHLORINATED BIPHENYLS

TOXAPHENE

SOLVENTS

OIL & GREASE

ORGANICS

ACID EXTRACTABLES (PHENOLS)

BENZIDINES

CHLORINATED HYDROCARBONS

HALOETHERS

ISOPHORONE

NITROSAMINES

PHTHALATE ESTERS

POLYNUCLEAR AROMATIC HYDROCARBONS

VOLATILE ORGANICS

PLANT TISSUES

STATUS REPORTED ON 10/31/2018

ANALYTE NAME

METALS

ARSENIC

CADMIUM

LEAD

NICKEL

ZINC

CHROMIUM

MERCURY

SELENIUM

PESTICIDES/ PCB'S

CHLORDANE (TECHNICAL)

ORGANOCHLORINE PESTICIDES (Single
Response)

TOXAPHENE

POLYCHLORINATED BIPHENYLS

SOLID WASTE/SOIL (RCRA)

STATUS REPORTED ON 10/31/2018

ANALYTE NAME

METALS

ALUMINUM	
ANTIMONY	ARSENIC
BARIUM	BERYLLIUM
BORON	CADMIUM
CALCIUM	CHROMIUM
COBALT	COPPER
IRON	LEAD
MAGNESIUM	MANGANESE
MERCURY	MOLYBDENUM
NICKEL	POTASSIUM
SELENIUM	SILVER
SODIUM	THALLIUM
VANADIUM	ZINC

PESTICIDES/ PCB'S

CHLORDANE (TECHNICAL)	ORGANOCHLORINE PESTICIDES (Single Response)
POLYCHLORINATED BIPHENYLS	TOXAPHENE

RCRA (SW-846) ORGANICS

PAH's (SW 8270)

Report Profile: Lab Name : EnviroSystems div. of Enthalpy Analytical, LLC
Test Name : *
Matrix Name : *
Matrix Selection = ALL OR SOME MATRICES SELECTED
Certifications approved or provisional on 10/31/2018

THIS IS THE LAST PAGE OF THE REPORT

State of Maine

Laboratory Accreditation Program

Awards Accreditation To

Enthalpy Analytical, LLC

Located at

1 Lafayette Road, Hampton, NH 03842

For the demonstration of capability of performing the analyses listed on the attached
accredited analyte list(s) as required by 22 M.R.S.A., Chapter 157-A.

Laboratory ID: NH00906
Certificate Number: 2019023
Date of Issue: 2019-06-04
Expiration Date: 2021-06-03

Jennifer Jamison, M.S.
Accreditation Officer

This certificate must be displayed with the corresponding analyte list.
This certificate supersedes all previously issued certificates. Continuing accreditation status is dependent on successful ongoing participation in the program. Customers may verify the laboratory's current accreditation status by calling (207) 287-1929.



Department of Health and Human Services
Maine Center for Disease Control and Prevention
286 Water Street
11 State House Station
Augusta, Maine 04333-0011
Tel: (207) 287-1929; Fax: (207) 287-4172
TTY: 1-800-606-0215

Field of Testing Summary for:

Enthalpy Analytical, LLC

(949)-988-7390

1 Lafayette Road
Hampton, NH 03842

As required by 22 M.R.S.A Chapter 157-A the laboratory demonstrated the capability to analyze samples under 10-144 and 06-096 CMR 263, the rule for laboratory accreditation and is hereby granted accreditation for:

EPA 1664A (HEM)

n-Hexane Extractable Material (O&G)

EPA 200.8 Rev. 5.4

Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Calcium
Chromium
Cobalt
Copper
Lead
Manganese
Molybdenum
Nickel
Selenium
Silver
Thallium
Vanadium
Zinc

Clean Water Program (NPW)

Clean Water Program (NPW)
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Clean Water Program (NPW)
Clean Water Program (NPW)

EPA 245.7

Mercury

Clean Water Program (NPW)

EPA 6020B

Aluminum
Antimony
Arsenic
Barium
Beryllium
Boron
Cadmium
Calcium
Chromium
Cobalt
Copper
Lead
Magnesium
Manganese

Resource Conservation Recovery Program (S)
Resource Conservation Recovery Program (S)
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To be considered valid, this Fields of Testing Summary must be displayed with a current certificate.

NH00906 65
Certificate Number: 2019023 (243)
FOT Issue Date: 2019-06-12
Expiration Date: 2021-06-03

Jennifer Jamison

Jennifer Jamison, Accreditation Officer

Page 1 of 5

Printed: 6/12/2019

Molybdenum
Nickel
Potassium
Selenium
Silver
Sodium
Thallium
Vanadium
Zinc

EPA 608

4,4'-DDD
4,4'-DDE
4,4'-DDT
Aldrin
alpha-BHC
Aroclor-1016 (PCB-1016)
Aroclor-1221 (PCB-1221)
Aroclor-1232 (PCB-1232)
Aroclor-1242 (PCB-1242)
Aroclor-1248 (PCB-1248)
Aroclor-1254 (PCB-1254)
Aroclor-1260 (PCB-1260)
beta-BHC
delta-BHC
Dieldrin
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
Endrin aldehyde
gamma-BHC
Heptachlor
Heptachlor epoxide
Toxaphene

EPA 624

1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1,2-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethylene
1,2-Dichlorobenzene
1,2-Dichloroethane
1,2-Dichloropropane
2-Chloroethyl vinyl ether
Acrolein
Acrylonitrile
Benzene
Bromodichloromethane
Bromoform
Bromomethane (Methyl bromide)
Carbon tetrachloride
Chlorobenzene
Chloroethane
Chloroform
cis-1,3-Dichloropropene
Dibromochloromethane
Dichloromethane (Methylene chloride)
Methyl chloride (Chloromethane)
Tetrachloroethylene
trans-1,2-Dichloroethylene

Resource Conservation Recovery Program (S)
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To be considered valid, this Fields of Testing Summary must be displayed with a current certificate.

NH00906 65
Certificate Number: 2019023 (243)
FOT Issue Date: 2019-06-12
Expiration Date: 2021-06-03


Jennifer Jamison, Accreditation Officer

Clean Water Program (NPW)
Clean Water Program (NPW)
Clean Water Program (NPW)
Clean Water Program (NPW)

[illegible][illegible]

Jennifer Jamison
Jennifer Jamison, Accreditation Officer

cis-Nonachlor	Resource Conservation Recovery Program (S)
delta-BHC	Resource Conservation Recovery Program (S)
Dieldrin	Resource Conservation Recovery Program (S)
Endosulfan I	Resource Conservation Recovery Program (S)
Endosulfan II	Resource Conservation Recovery Program (S)
Endosulfan sulfate	Resource Conservation Recovery Program (S)
Endrin	Resource Conservation Recovery Program (S)
Endrin aldehyde	Resource Conservation Recovery Program (S)
Endrin ketone	Resource Conservation Recovery Program (S)
gamma-BHC	Resource Conservation Recovery Program (S)
gamma-Chlordane	Resource Conservation Recovery Program (S)
Heptachlor	Resource Conservation Recovery Program (S)
Heptachlor epoxide	Resource Conservation Recovery Program (S)
Hexachlorobenzene	Resource Conservation Recovery Program (S)
Methoxychlor	Resource Conservation Recovery Program (S)
Oxychlorane	Resource Conservation Recovery Program (S)
Toxaphene	Resource Conservation Recovery Program (S)
trans Nonachlor	Resource Conservation Recovery Program (S)
<u>EPA 8082A</u>	
Aroclor-1016 (PCB-1016)	Resource Conservation Recovery Program (S)
Aroclor-1221 (PCB-1221)	Resource Conservation Recovery Program (S)
Aroclor-1232 (PCB-1232)	Resource Conservation Recovery Program (S)
Aroclor-1242 (PCB-1242)	Resource Conservation Recovery Program (S)
Aroclor-1248 (PCB-1248)	Resource Conservation Recovery Program (S)
Aroclor-1254 (PCB-1254)	Resource Conservation Recovery Program (S)
Aroclor-1260 (PCB-1260)	Resource Conservation Recovery Program (S)
<u>EPA 8270C</u>	
Acenaphthene	Resource Conservation Recovery Program (S)
Acenaphthylene	Resource Conservation Recovery Program (S)
Anthracene	Resource Conservation Recovery Program (S)
Benzo[a]anthracene	Resource Conservation Recovery Program (S)
Benzo[a]pyrene	Resource Conservation Recovery Program (S)
Benzo[b]fluoranthene	Resource Conservation Recovery Program (S)
Benzo[g,h,i]perylene	Resource Conservation Recovery Program (S)
Benzo[k]fluoranthene	Resource Conservation Recovery Program (S)
Chrysene	Resource Conservation Recovery Program (S)
Dibenz[a,h]anthracene	Resource Conservation Recovery Program (S)
Fluoranthene	Resource Conservation Recovery Program (S)
Fluorene	Resource Conservation Recovery Program (S)
Indeno[1,2,3-cd]pyrene	Resource Conservation Recovery Program (S)
Naphthalene	Resource Conservation Recovery Program (S)
Phenanthrene	Resource Conservation Recovery Program (S)
Pyrene	Resource Conservation Recovery Program (S)
<u>SM 2540 B 22nd ED</u>	
Residue-total (TS)	Clean Water Program (NPW)
<u>SM 2540 C 22nd ED</u>	
Residue-filterable (TDS)	Clean Water Program (NPW)
<u>SM 2540 D 22nd ED</u>	
Residue-nonfilterable (TSS)	Clean Water Program (NPW)
<u>SM 3500-Cr B 22nd ED</u>	
Chromium VI	Clean Water Program (NPW)
<u>SM 4500-CN E 22nd ED</u>	
Total Cyanide	Clean Water Program (NPW)
<u>SM 4500-NH3 G 22nd ED</u>	
Ammonia as N	Clean Water Program (NPW)
<u>SM 4500-Norg C 22nd ED</u>	
Kjeldahl nitrogen - total	Clean Water Program (NPW)
<u>SM 5210 B 22nd ED</u>	
Biochemical oxygen demand	Clean Water Program (NPW)

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NH00906 65
 Certificate Number: 2019023 (243)
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 Jennifer Jamison, Accreditation Officer

Page 4 of 5
 Printed: 6/12/2019


Carbonaceous BOD, CBOD
SM 5310 B 22nd ED
Total Organic Carbon

Clean Water Program (NPW)

Clean Water Program (NPW)

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NH00906 65
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Jennifer Jamison, Accreditation Officer

Page 5 of 5
Printed: 6/12/2019

The Commonwealth of Massachusetts



Department of Environmental Protection

Division of Environmental Laboratory Sciences

Senator William X. Wall Experiment Station

certifies

M-NH906

ENTHALPY ANALYTICAL, LLC
1 LAFAYETTE RD
HAMPTON, NH 03842-0000

Laboratory Director: JASON HOBBS

for the analysis of NON POTABLE WATER (CHEMISTRY)

pursuant to 310 CMR 42.00

This certificate supersedes all previous Massachusetts certificates issued to this laboratory. The laboratory is regulated by and shall be responsible for being in compliance with Massachusetts regulations at 310 CMR 42.00.

This certificate is valid only when accompanied by the latest dated Certified Parameter List as issued by the Massachusetts D.E.P. Contact the Division of Environmental Laboratory Sciences to verify the current certification status of the laboratory.

Certification is no guarantee of the validity of the data. This certification is subject to unannounced laboratory inspections.

A handwritten signature in dark ink, appearing to read "Oscar C. Sarcobello".

Director, Division of Environmental Laboratory Sciences

Issued: 01 JUL 2019

Expires: 30 JUN 2020

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Certified Parameter List as of: 02 AUG 2019

M-NH906 ENTHALPY ANALYTICAL, LLC
HAMPTON NH

NON POTABLE WATER (CHEMISTRY)	Effective Date	02 AUG 2019	Expiration Date	30 JUN 2020
<u>Analytes</u>			<u>Methods</u>	
ALUMINUM			EPA 200.8	
ANTIMONY			EPA 200.8	
ARSENIC			EPA 200.8	
BERYLLIUM			EPA 200.8	
CADMIUM			EPA 200.8	
CHROMIUM			EPA 200.8	
COBALT			EPA 200.8	
COPPER			EPA 200.8	
IRON			EPA 200.8	
LEAD			EPA 200.8	
MANGANESE			EPA 200.8	
MERCURY			EPA 245.7	
MOLYBDENUM			EPA 200.8	
NICKEL			EPA 200.8	
SELENIUM			EPA 200.8	
SILVER			EPA 200.8	
THALLIUM			EPA 200.8	
VANADIUM			EPA 200.8	
ZINC			EPA 200.8	
PH			SM 4500-H-B	
SPECIFIC CONDUCTIVITY			SM 2510B	
TOTAL DISSOLVED SOLIDS			SM 2540C	
ALKALINITY, TOTAL			EPA 310.2	
CHLORIDE			EPA 300.0	
SULFATE			EPA 300.0	
AMMONIA-N			SM 4500-NH3-B, G	
NITRATE-N			SM 4500-NO3-F	
KJELDAHL-N			SM 4500-NH3-B, G	
ORTHOPHOSPHATE			SM 4500-P-E	
PHOSPHORUS, TOTAL			SM 4500-P-B,E	
BIOCHEMICAL OXYGEN DEMAND			SM 5210B	
NON-FILTERABLE RESIDUE			SM 2540D	
OIL AND GREASE			EPA 1664	



State of New Hampshire
Environmental Laboratory Accreditation Program
Awards
PRIMARY NH ELAP ACCREDITATION
to
ENTHALPY ANALYTICAL LLC
of
HAMPTON, NH

For the matrix, method and analytes listed on the latest Analyte List in accordance
with the provisions on the 2009 TNI Standards and Env-C 300.

Certificate Number: 151319

Effective Date: 6/15/2019

Expiration Date: 6/14/2020

Laboratory ID: 1513



Bill Hall
ENTHALPY6/13/2019

Bill Hall
NH ELAP Program Manager

Method accreditation does not imply acceptance for NHDES compliance testing. Laboratory is required to use EPA-approved methods required by regulation. Continuing accreditation status is dependent on successful ongoing participation in the program. Customers may verify the laboratory's current accreditation status by calling (603) 271-2998 or by visiting the NH ELAP website (<https://www.des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>).

29 Hazen Drive, PO Box 95, Concord, NH 03302 (603) 271-2998

PRIMARY ACCREDITATION ANALYTE LIST

ANALYTE LIST NUMBER: 151319-B



**ENTHALPY ANALYTICAL LLC
1 LAFAYETTE RD UNIT 6**

**HAMPTON NH 03842
603-926-3345
Lab ID: 1513**



Analyte Code	Analyte Name	Effective Date	Expiration Date	Matrix	Category	Accr. Type
Method Code: 20209603	Method Ref: SM 9222 D (M-FC)		Revision: 20th ED		Date: 1998	
2530	FECAL COLIFORMS	09/26/2008	06/14/2020	N	MIC	NE
Method Code: 20213610	Method Ref: SM 9223 B (COLILERT-18 QUANTI-TRAY)-2004		Revision:		Date: 2004	
2530	FECAL COLIFORMS	05/12/2019	06/14/2020	N	MIC	NE
Method Code: 10014605	Method Ref: EPA 200.8		Revision: 5.4		Date: 1994	
1000	ALUMINUM, TOTAL	03/23/2010	06/14/2020	N	MET	NE
1005	ANTIMONY, TOTAL	03/23/2010	06/14/2020	N	MET	NE
1010	ARSENIC, TOTAL	09/26/2008	06/14/2020	N	MET	NE
1015	BARIUM, TOTAL	09/26/2008	06/14/2020	N	MET	NE
1020	BERYLLIUM, TOTAL	09/26/2008	06/14/2020	N	MET	NE
1025	BORON, TOTAL	03/23/2010	06/14/2020	N	MET	NE
1030	CADMIUM, TOTAL	09/26/2008	06/14/2020	N	MET	NE
1035	CALCIUM, TOTAL	03/23/2010	06/14/2020	N	MET	NE
1040	CHROMIUM, TOTAL	09/26/2008	06/14/2020	N	MET	NE
1050	COBALT, TOTAL	09/26/2008	06/14/2020	N	MET	NE
1055	COPPER, TOTAL	09/26/2008	06/14/2020	N	MET	NE
1070	IRON, TOTAL	09/26/2008	06/14/2020	N	MET	NE
1075	LEAD, TOTAL	09/26/2008	06/14/2020	N	MET	NE
1085	MAGNESIUM, TOTAL	03/23/2010	06/14/2020	N	MET	NE
1090	MANGANESE, TOTAL	09/26/2008	06/14/2020	N	MET	NE
1100	MOLYBDENUM, TOTAL	09/26/2008	06/14/2020	N	MET	NE
1105	NICKEL, TOTAL	09/26/2008	06/14/2020	N	MET	NE
1125	POTASSIUM, TOTAL	07/31/2008	06/14/2020	N	MET	NE
1140	SELENIUM, TOTAL	09/26/2008	06/14/2020	N	MET	NE
1150	SILVER, TOTAL	09/26/2008	06/14/2020	N	MET	NE
1155	SODIUM, TOTAL	03/23/2010	06/14/2020	N	MET	NE
1165	THALLIUM, TOTAL	09/26/2008	06/14/2020	N	MET	NE
1185	VANADIUM, TOTAL	09/26/2008	06/14/2020	N	MET	NE
1190	ZINC, TOTAL	09/26/2008	06/14/2020	N	MET	NE
Method Code: 10038105	Method Ref: EPA 245.7		Revision: 2		Date: 2005	
1095	MERCURY, TOTAL	12/07/2017	06/14/2020	N	MET	NE
Method Code: 20066017	Method Ref: SM 3500-CR B		Revision: 22ND ED		Date: 2011	
1045	CHROMIUM VI	04/17/2017	06/14/2020	N	MET	NE
Method Code: 10014605	Method Ref: EPA 200.8		Revision: 5.4		Date: 1994	
1755	HARDNESS AS CaCO3	05/29/2015	06/14/2020	N	NMI	NE

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29 Hazen Drive, PO Box 95, Concord, NH 03302 (603) 271-2998

PRIMARY ACCREDITATION ANALYTE LIST

ANALYTE LIST NUMBER: 151319-B



ENTHALPY ANALYTICAL LLC
1 LAFAYETTE RD UNIT 6

HAMPTON NH 03842
603-926-3345
Lab ID: 1513



Method Code: 10053200	Method Ref: EPA 300.0		Revision: 2.1	Date: 1993		
1575	CHLORIDE	03/21/2014	06/14/2020	N	NMI	NE
2000	SULFATE	03/21/2014	06/14/2020	N	NMI	NE
Method Code: 10055206	Method Ref: EPA 310.2		Revision:	Date: 1974		
1505	ALKALINITY	09/26/2008	06/14/2020	N	NMI	NE
Method Code: 10127807	Method Ref: EPA 1664A		Revision:	Date: 1999		
1803	N-HEXANE EXTRACTABLE MATERIAL (O&G) [HEM]	10/17/2016	06/14/2020	N	NMI	NE
1853	NON-POLAR EXTRACTABLE MATERIAL (TPH)	12/01/2017	06/14/2020	N	NMI	NE
Method Code: 20048413	Method Ref: SM 2510 B		Revision: 22ND ED	Date: 2011		
1610	CONDUCTIVITY	10/14/2016	06/14/2020	N	NMI	NE
Method Code: 20049212	Method Ref: SM 2540 B		Revision: 22ND ED	Date: 2011		
1950	RESIDUE, TOTAL (TS)	10/14/2016	06/14/2020	N	NMI	NE
Method Code: 20050424	Method Ref: SM 2540 C		Revision: 22ND ED	Date: 2011		
1955	RESIDUE, FILTERABLE (TDS)	08/02/2017	06/14/2020	N	NMI	NE
Method Code: 20051018	Method Ref: SM 2540 D		Revision: 22ND ED	Date: 2011		
1960	RESIDUE, NON-FILTERABLE (TSS)	10/14/2016	06/14/2020	N	NMI	NE
Method Code: 20096213	Method Ref: SM 4500-CN E		Revision: 22ND ED	Date: 2011		
1645	CYANIDE, TOTAL	10/14/2016	06/14/2020	N	NMI	NE
Method Code: 20105015	Method Ref: SM 4500-H+ B		Revision: 22ND ED	Date: 2011		
1900	HYDROGEN ION (PH)	10/14/2016	06/14/2020	N	NMI	NE
Method Code: 20111211	Method Ref: SM 4500-NH3 G		Revision: 22ND ED	Date: 2011		
1515	AMMONIA	10/14/2016	06/14/2020	N	NMI	NE
1795	TOTAL KJELDAHL NITROGEN (TKN)	10/14/2016	06/14/2020	N	NMI	NE
Method Code: 20116410	Method Ref: SM 4500-NO3 F		Revision: 22ND ED	Date: 2011		
1810	NITRATE AS N	10/14/2016	06/14/2020	N	NMI	NE
1820	NITRATE-NITRITE AS N	10/14/2016	06/14/2020	N	NMI	NE
Method Code: 20124010	Method Ref: SM 4500-P E		Revision: 22ND ED	Date: 2011		
1870	ORTHOPHOSPHATE AS P	10/14/2016	06/14/2020	N	NMI	NE
1910	PHOSPHORUS, TOTAL	10/14/2016	06/14/2020	N	NMI	NE
Method Code: 20135017	Method Ref: SM 5210 B		Revision: 22ND ED	Date: 2011		
1530	BIOCHEMICAL OXYGEN DEMAND (BOD)	10/14/2016	06/14/2020	N	NMI	NE
1555	CARBONACEOUS BIOLOGICAL OXYGEN DEMAND	10/14/2016	06/14/2020	N	NMI	NE
Method Code: 20135813	Method Ref: SM 5220 C		Revision: 22ND ED	Date: 2011		
1565	COD	10/14/2016	06/14/2020	N	NMI	NE
Method Code: 20137615	Method Ref: SM 5310 B		Revision: 22ND ED	Date: 2011		
2040	TOTAL ORGANIC CARBON (TOC)	05/12/2019	06/14/2020	N	NMI	NE
Method Code: 20119817	Method Ref: SM 4500-NORG C		Revision: 22ND ED	Date: 2011		
1462	TKN DIGESTION & DISTILLATION	10/14/2016	06/14/2020	N	PRE	NE

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NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

29 Hazen Drive, PO Box 95, Concord, NH 03302 (603) 271-2998

PRIMARY ACCREDITATION ANALYTE LIST

ANALYTE LIST NUMBER: 151319-B



ENTHALPY ANALYTICAL LLC
1 LAFAYETTE RD UNIT 6

HAMPTON NH 03842
603-926-3345
Lab ID: 1513



Method Code: 10107207	Method Ref: EPA 624		Revision:	Date: 1984		
5160	1,1,1-TRICHLOROETHANE	01/19/2018	06/14/2020	N	VOC	NE
5110	1,1,2,2-TETRACHLOROETHANE	01/19/2018	06/14/2020	N	VOC	NE
5165	1,1,2-TRICHLOROETHANE	01/19/2018	06/14/2020	N	VOC	NE
4630	1,1-DICHLOROETHANE	01/19/2018	06/14/2020	N	VOC	NE
4640	1,1-DICHLOROETHENE	01/19/2018	06/14/2020	N	VOC	NE
4610	1,2-DICHLOROBENZENE	01/19/2018	06/14/2020	N	VOC	NE
4635	1,2-DICHLOROETHANE	01/19/2018	06/14/2020	N	VOC	NE
4655	1,2-DICHLOROPROPANE	01/19/2018	06/14/2020	N	VOC	NE
4615	1,3-DICHLOROBENZENE	08/07/2018	06/14/2020	N	VOC	NE
4620	1,4-DICHLOROBENZENE	08/07/2018	06/14/2020	N	VOC	NE
4500	2-CHLOROETHYL VINYL ETHER	01/19/2018	06/14/2020	N	VOC	NE
4315	ACETONE	08/07/2018	06/14/2020	N	VOC	NE
4325	ACROLEIN (PROPENAL)	01/19/2018	06/14/2020	N	VOC	NE
4340	ACRYLONITRILE	01/19/2018	06/14/2020	N	VOC	NE
4375	BENZENE	01/19/2018	06/14/2020	N	VOC	NE
4395	BROMODICHLOROMETHANE	01/19/2018	06/14/2020	N	VOC	NE
4400	BROMOFORM	01/19/2018	06/14/2020	N	VOC	NE
4950	BROMOMETHANE (METHYL BROMIDE)	01/19/2018	06/14/2020	N	VOC	NE
4455	CARBON TETRACHLORIDE	01/19/2018	06/14/2020	N	VOC	NE
4475	CHLOROBENZENE	01/19/2018	06/14/2020	N	VOC	NE
4485	CHLOROETHANE	01/19/2018	06/14/2020	N	VOC	NE
4505	CHLOROFORM	08/27/2018	06/14/2020	N	VOC	NE
4960	CHLOROMETHANE (METHYL CHLORIDE)	01/19/2018	06/14/2020	N	VOC	NE
4680	CIS-1,3-DICHLOROPROPENE	01/19/2018	06/14/2020	N	VOC	NE
4575	DIBROMOCHLOROMETHANE	01/19/2018	06/14/2020	N	VOC	NE
4975	DICHLOROMETHANE (METHYLENE CHLORIDE)	01/19/2018	06/14/2020	N	VOC	NE
4765	ETHYLBENZENE	08/07/2018	06/14/2020	N	VOC	NE
5115	TETRACHLOROETHENE (PERCHLOROETHYLENE)	01/19/2018	06/14/2020	N	VOC	NE
5140	TOLUENE	08/07/2018	06/14/2020	N	VOC	NE
4700	TRANS-1,2-DICHLOROETHYLENE	01/19/2018	06/14/2020	N	VOC	NE
4685	TRANS-1,3-DICHLOROPROPENE	01/19/2018	06/14/2020	N	VOC	NE
5170	TRICHLOROETHENE (TRICHLOROETHYLENE)	01/19/2018	06/14/2020	N	VOC	NE
5175	TRICHLOROFLUOROMETHANE	01/19/2018	06/14/2020	N	VOC	NE
5235	VINYL CHLORIDE	01/19/2018	06/14/2020	N	VOC	NE

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NEW HAMPSHIRE ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

29 Hazen Drive, PO Box 95, Concord, NH 03302 (603) 271-2998

PRIMARY ACCREDITATION ANALYTE LIST

ANALYTE LIST NUMBER: 151319-B



ENTHALPY ANALYTICAL LLC
1 LAFAYETTE RD UNIT 6

HAMPTON NH 03842
603-926-3345
Lab ID: 1513



Method Code: 10107401		Method Ref: EPA 625		Revision:		Date: 1984	
5155	1,2,4-TRICHLOROBENZENE	01/19/2018	06/14/2020	N	VOC	NE	
4835	HEXACHLOROBUTADIENE	01/19/2018	06/14/2020	N	VOC	NE	
4840	HEXACHLOROETHANE	01/19/2018	06/14/2020	N	VOC	NE	
5005	NAPHTHALENE	01/19/2018	06/14/2020	N	VOC	NE	
5015	NITROBENZENE	01/19/2018	06/14/2020	N	VOC	NE	
Method Code: 10298121		Method Ref: EPA 624.1		Revision:		Date: 2016	
5160	1,1,1-TRICHLOROETHANE	08/13/2019	06/14/2020	N	VOC	NE	
5110	1,1,2,2-TETRACHLOROETHANE	08/13/2019	06/14/2020	N	VOC	NE	
5165	1,1,2-TRICHLOROETHANE	08/13/2019	06/14/2020	N	VOC	NE	
4630	1,1-DICHLOROETHANE	08/13/2019	06/14/2020	N	VOC	NE	
4640	1,1-DICHLOROETHENE	08/13/2019	06/14/2020	N	VOC	NE	
5155	1,2,4-TRICHLOROBENZENE	08/13/2019	06/14/2020	N	VOC	NE	
4610	1,2-DICHLOROBENZENE	08/13/2019	06/14/2020	N	VOC	NE	
4635	1,2-DICHLOROETHANE	08/13/2019	06/14/2020	N	VOC	NE	
4655	1,2-DICHLOROPROPANE	08/13/2019	06/14/2020	N	VOC	NE	
4615	1,3-DICHLOROBENZENE	08/13/2019	06/14/2020	N	VOC	NE	
4620	1,4-DICHLOROBENZENE	08/13/2019	06/14/2020	N	VOC	NE	
4500	2-CHLOROETHYL VINYL ETHER	08/13/2019	06/14/2020	N	VOC	NE	
4315	ACETONE	08/13/2019	06/14/2020	N	VOC	NE	
4325	ACROLEIN (PROPENAL)	08/13/2019	06/14/2020	N	VOC	NE	
4340	ACRYLONITRILE	08/13/2019	06/14/2020	N	VOC	NE	
4375	BENZENE	08/13/2019	06/14/2020	N	VOC	NE	
4395	BROMODICHLOROMETHANE	08/13/2019	06/14/2020	N	VOC	NE	
4400	BROMOFORM	08/13/2019	06/14/2020	N	VOC	NE	
4950	BROMOMETHANE (METHYL BROMIDE)	08/13/2019	06/14/2020	N	VOC	NE	
4455	CARBON TETRACHLORIDE	08/13/2019	06/14/2020	N	VOC	NE	
4475	CHLOROBENZENE	08/13/2019	06/14/2020	N	VOC	NE	
4485	CHLOROETHANE	08/13/2019	06/14/2020	N	VOC	NE	
4505	CHLOROFORM	08/13/2019	06/14/2020	N	VOC	NE	
4960	CHLOROMETHANE (METHYL CHLORIDE)	08/13/2019	06/14/2020	N	VOC	NE	
4680	CIS-1,3-DICHLOROPROPENE	08/13/2019	06/14/2020	N	VOC	NE	
4575	DIBROMOCHLOROMETHANE	08/13/2019	06/14/2020	N	VOC	NE	
4975	DICHLOROMETHANE (METHYLENE CHLORIDE)	08/13/2019	06/14/2020	N	VOC	NE	
4765	ETHYLBENZENE	08/13/2019	06/14/2020	N	VOC	NE	
4835	HEXACHLOROBUTADIENE	08/13/2019	06/14/2020	N	VOC	NE	

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ANALYTE LIST NUMBER: 151319-B



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HAMPTON NH 03842
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5005	NAPHTHALENE	08/13/2019	06/14/2020	N	VOC	NE
5115	TETRACHLOROETHENE (PERCHLOROETHYLENE)	08/13/2019	06/14/2020	N	VOC	NE
5140	TOLUENE	08/13/2019	06/14/2020	N	VOC	NE
4700	TRANS-1,2-DICHLOROETHYLENE	08/13/2019	06/14/2020	N	VOC	NE
4685	TRANS-1,3-DICHLOROPROPENE	08/13/2019	06/14/2020	N	VOC	NE
5170	TRICHLOROETHENE (TRICHLOROETHYLENE)	08/13/2019	06/14/2020	N	VOC	NE
5175	TRICHLOROFLUOROMETHANE	08/13/2019	06/14/2020	N	VOC	NE
5235	VINYL CHLORIDE	08/13/2019	06/14/2020	N	VOC	NE
Method Code: 10300024 Method Ref: EPA 625.1		Revision:		Date: 2016		
5155	1,2,4-TRICHLOROBENZENE	08/13/2019	06/14/2020	N	VOC	NE
4835	HEXACHLOROBUTADIENE	08/13/2019	06/14/2020	N	VOC	NE
4840	HEXACHLOROETHANE	08/13/2019	06/14/2020	N	VOC	NE
5005	NAPHTHALENE	08/13/2019	06/14/2020	N	VOC	NE
5015	NITROBENZENE	08/13/2019	06/14/2020	N	VOC	NE
Method Code: 10107401 Method Ref: EPA 625		Revision:		Date: 1984		
4659	2,2'-OXYBIS(1-CHLOROPROPANE)	01/19/2018	06/14/2020	N	SBN	NE
6840	2,4,6-TRICHLOROPHENOL	01/19/2018	06/14/2020	N	SBN	NE
6000	2,4-DICHLOROPHENOL	01/19/2018	06/14/2020	N	SBN	NE
6185	2,4-DINITROTOLUENE (2 4-DNT)	01/19/2018	06/14/2020	N	SBN	NE
6190	2,6-DINITROTOLUENE (2 6-DNT)	01/19/2018	06/14/2020	N	SBN	NE
5795	2-CHLORONAPHTHALENE	01/19/2018	06/14/2020	N	SBN	NE
5800	2-CHLOROPHENOL	01/19/2018	06/14/2020	N	SBN	NE
6360	2-METHYL-4,6-DINITROPHENOL	01/19/2018	06/14/2020	N	SBN	NE
6490	2-NITROPHENOL	01/19/2018	06/14/2020	N	SBN	NE
5945	3,3-DICHLOROBENZIDINE	01/19/2018	06/14/2020	N	SBN	NE
5660	4-BROMOPHENYL PHENYL ETHER	01/19/2018	06/14/2020	N	SBN	NE
5700	4-CHLORO-3-METHYLPHENOL	01/19/2018	06/14/2020	N	SBN	NE
5825	4-CHLOROPHENYL PHENYL ETHER	01/19/2018	06/14/2020	N	SBN	NE
6500	4-NITROPHENOL	01/19/2018	06/14/2020	N	SBN	NE
5500	ACENAPHTHENE	01/19/2018	06/14/2020	N	SBN	NE
5505	ACENAPHTHYLENE	01/19/2018	06/14/2020	N	SBN	NE
5555	ANTHRACENE	01/19/2018	06/14/2020	N	SBN	NE
5595	BENZIDINE	01/19/2018	06/14/2020	N	SBN	NE
5575	BENZO(A)ANTHRACENE	01/19/2018	06/14/2020	N	SBN	NE
5580	BENZO(A)PYRENE	01/19/2018	06/14/2020	N	SBN	NE
5585	BENZO(B)FLUORANTHENE	01/19/2018	06/14/2020	N	SBN	NE

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5590	BENZO(G,H,I)PERYLENE	01/19/2018	06/14/2020	N	SBN	NE
5600	BENZO(K)FLUORANTHENE	01/19/2018	06/14/2020	N	SBN	NE
5670	BENZYL BUTYL PHTHALATE	01/19/2018	06/14/2020	N	SBN	NE
5760	BIS(2-CHLOROETHOXY) METHANE	01/19/2018	06/14/2020	N	SBN	NE
5765	BIS(2-CHLOROETHYL) ETHER	01/19/2018	06/14/2020	N	SBN	NE
6065	BIS(2-ETHYLHEXYL) PHTHALATE	01/19/2018	06/14/2020	N	SBN	NE
5855	CHRYSENE	01/19/2018	06/14/2020	N	SBN	NE
5925	DI-N-BUTYL PHTHALATE	01/19/2018	06/14/2020	N	SBN	NE
6200	DI-N-OCTYL PHTHALATE	01/19/2018	06/14/2020	N	SBN	NE
5895	DIBENZO(A,H)ANTHRACENE	01/19/2018	06/14/2020	N	SBN	NE
6070	DIETHYL PHTHALATE	01/19/2018	06/14/2020	N	SBN	NE
6135	DIMETHYL PHTHALATE	01/19/2018	06/14/2020	N	SBN	NE
6265	FLUORANTHENE	01/19/2018	06/14/2020	N	SBN	NE
6270	FLUORENE	01/19/2018	06/14/2020	N	SBN	NE
6275	HEXACHLOROBENZENE	01/19/2018	06/14/2020	N	SBN	NE
6315	INDENO(1,2,3-CD)PYRENE	01/19/2018	06/14/2020	N	SBN	NE
6320	ISOPHORONE	01/19/2018	06/14/2020	N	SBN	NE
6545	N-NITROSODI-N-PROPYLAMINE	01/19/2018	06/14/2020	N	SBN	NE
6530	N-NITROSODIMETHYLAMINE	01/19/2018	06/14/2020	N	SBN	NE
6535	N-NITROSODIPHENYLAMINE	01/19/2018	06/14/2020	N	SBN	NE
6605	PENTACHLOROPHENOL	01/19/2018	06/14/2020	N	SBN	NE
6615	PHENANTHRENE	01/19/2018	06/14/2020	N	SBN	NE
6625	PHENOL	01/19/2018	06/14/2020	N	SBN	NE
6665	PYRENE	01/19/2018	06/14/2020	N	SBN	NE

Method Code: 10300024 Method Ref: EPA 625.1

Revision:

Date: 2016

4659	2,2'-OXYBIS(1-CHLOROPROPANE)	08/13/2019	06/14/2020	N	SBN	NE
6840	2,4,6-TRICHLOROPHENOL	08/13/2019	06/14/2020	N	SBN	NE
6000	2,4-DICHLOROPHENOL	08/13/2019	06/14/2020	N	SBN	NE
6185	2,4-DINITROTOLUENE (2 4-DNT)	08/13/2019	06/14/2020	N	SBN	NE
6190	2,6-DINITROTOLUENE (2 6-DNT)	08/13/2019	06/14/2020	N	SBN	NE
5795	2-CHLORONAPHTHALENE	08/13/2019	06/14/2020	N	SBN	NE
5800	2-CHLOROPHENOL	08/13/2019	06/14/2020	N	SBN	NE
6360	2-METHYL-4,6-DINITROPHENOL	08/13/2019	06/14/2020	N	SBN	NE
6490	2-NITROPHENOL	08/13/2019	06/14/2020	N	SBN	NE
5945	3,3-DICHLOROBENZIDINE	08/13/2019	06/14/2020	N	SBN	NE
5660	4-BROMOPHENYL PHENYL ETHER	08/13/2019	06/14/2020	N	SBN	NE

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5700	4-CHLORO-3-METHYLPHENOL	08/13/2019	06/14/2020	N	SBN	NE
5825	4-CHLOROPHENYL PHENYL ETHER	08/13/2019	06/14/2020	N	SBN	NE
6500	4-NITROPHENOL	08/13/2019	06/14/2020	N	SBN	NE
5500	ACENAPHTHENE	08/13/2019	06/14/2020	N	SBN	NE
5505	ACENAPHTHYLENE	08/13/2019	06/14/2020	N	SBN	NE
5555	ANTHRACENE	08/13/2019	06/14/2020	N	SBN	NE
5595	BENZIDINE	08/13/2019	06/14/2020	N	SBN	NE
5575	BENZO(A)ANTHRACENE	08/13/2019	06/14/2020	N	SBN	NE
5580	BENZO(A)PYRENE	08/13/2019	06/14/2020	N	SBN	NE
5585	BENZO(B)FLUORANTHENE	08/13/2019	06/14/2020	N	SBN	NE
5590	BENZO(G,H,I)PERYLENE	08/13/2019	06/14/2020	N	SBN	NE
5600	BENZO(K)FLUORANTHENE	08/13/2019	06/14/2020	N	SBN	NE
5670	BENZYL BUTYL PHTHALATE	08/13/2019	06/14/2020	N	SBN	NE
5760	BIS(2-CHLOROETHOXY) METHANE	08/13/2019	06/14/2020	N	SBN	NE
5765	BIS(2-CHLOROETHYL) ETHER	08/13/2019	06/14/2020	N	SBN	NE
6065	BIS(2-ETHYLHEXYL) PHTHALATE	08/13/2019	06/14/2020	N	SBN	NE
5855	CHRYSENE	08/13/2019	06/14/2020	N	SBN	NE
5925	DI-N-BUTYL PHTHALATE	08/13/2019	06/14/2020	N	SBN	NE
6200	DI-N-OCTYL PHTHALATE	08/13/2019	06/14/2020	N	SBN	NE
5895	DIBENZO(A,H)ANTHRACENE	08/13/2019	06/14/2020	N	SBN	NE
6070	DIETHYL PHTHALATE	08/13/2019	06/14/2020	N	SBN	NE
6135	DIMETHYL PHTHALATE	08/13/2019	06/14/2020	N	SBN	NE
6265	FLUORANTHENE	08/13/2019	06/14/2020	N	SBN	NE
6270	FLUORENE	08/13/2019	06/14/2020	N	SBN	NE
6275	HEXACHLOROBENZENE	08/13/2019	06/14/2020	N	SBN	NE
6315	INDENO(1,2,3-CD)PYRENE	08/13/2019	06/14/2020	N	SBN	NE
6320	ISOPHORONE	08/13/2019	06/14/2020	N	SBN	NE
6545	N-NITROSODI-N-PROPYLAMINE	08/13/2019	06/14/2020	N	SBN	NE
6530	N-NITROSODIMETHYLAMINE	08/13/2019	06/14/2020	N	SBN	NE
6535	N-NITROSODIPHENYLAMINE	08/13/2019	06/14/2020	N	SBN	NE
6605	PENTACHLOROPHENOL	08/13/2019	06/14/2020	N	SBN	NE
6615	PHENANTHRENE	08/13/2019	06/14/2020	N	SBN	NE
6625	PHENOL	08/13/2019	06/14/2020	N	SBN	NE
6665	PYRENE	08/13/2019	06/14/2020	N	SBN	NE

Method Code: 10103603 Method Ref: EPA 608

Revision:

Date: 1984

8880	AROCLOR-1016 (PCB-1016)	01/19/2018	06/14/2020	N	SPC	NE
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8885	AROCLOR-1221 (PCB-1221)	05/29/2018	06/14/2020	N	SPC	NE
8890	AROCLOR-1232 (PCB-1232)	01/19/2018	06/14/2020	N	SPC	NE
8895	AROCLOR-1242 (PCB-1242)	01/19/2018	06/14/2020	N	SPC	NE
8900	AROCLOR-1248 (PCB-1248)	01/19/2018	06/14/2020	N	SPC	NE
8905	AROCLOR-1254 (PCB-1254)	01/19/2018	06/14/2020	N	SPC	NE
8910	AROCLOR-1260 (PCB-1260)	01/19/2018	06/14/2020	N	SPC	NE
Method Code: 10296614 Method Ref: EPA 608.3 GC-ECD		Revision:		Date: 2016		
8880	AROCLOR-1016 (PCB-1016)	08/13/2019	06/14/2020	N	SPC	NE
8885	AROCLOR-1221 (PCB-1221)	08/13/2019	06/14/2020	N	SPC	NE
8890	AROCLOR-1232 (PCB-1232)	08/13/2019	06/14/2020	N	SPC	NE
8895	AROCLOR-1242 (PCB-1242)	08/13/2019	06/14/2020	N	SPC	NE
8900	AROCLOR-1248 (PCB-1248)	08/13/2019	06/14/2020	N	SPC	NE
8905	AROCLOR-1254 (PCB-1254)	08/13/2019	06/14/2020	N	SPC	NE
8910	AROCLOR-1260 (PCB-1260)	08/13/2019	06/14/2020	N	SPC	NE
Method Code: 10103603 Method Ref: EPA 608		Revision:		Date: 1984		
7355	4,4-DDD	01/19/2018	06/14/2020	N	SPE	NE
7360	4,4-DDE	01/19/2018	06/14/2020	N	SPE	NE
7365	4,4-DDT	01/19/2018	06/14/2020	N	SPE	NE
7025	ALDRIN	01/19/2018	06/14/2020	N	SPE	NE
7110	ALPHA-BHC (ALPHA-HEXACHLOROCYCLOHEXANE)	01/19/2018	06/14/2020	N	SPE	NE
7115	BETA-BHC (BETA-HEXACHLOROCYCLOHEXANE)	01/19/2018	06/14/2020	N	SPE	NE
7250	CHLORDANE (TECH.)	01/19/2018	06/14/2020	N	SPE	NE
7105	DELTA-BHC	01/19/2018	06/14/2020	N	SPE	NE
7470	DIELDRIN	01/19/2018	06/14/2020	N	SPE	NE
7510	ENDOSULFAN I	01/19/2018	06/14/2020	N	SPE	NE
7515	ENDOSULFAN II	01/19/2018	06/14/2020	N	SPE	NE
7520	ENDOSULFAN SULFATE	01/19/2018	06/14/2020	N	SPE	NE
7540	ENDRIN	01/19/2018	06/14/2020	N	SPE	NE
7530	ENDRIN ALDEHYDE	01/19/2018	06/14/2020	N	SPE	NE
7120	GAMMA-BHC (LINDANE)	01/19/2018	06/14/2020	N	SPE	NE
7685	HEPTACHLOR	01/19/2018	06/14/2020	N	SPE	NE
7690	HEPTACHLOR EPOXIDE	01/19/2018	06/14/2020	N	SPE	NE
7810	METHOXYCHLOR	01/19/2018	06/14/2020	N	SPE	NE
8250	TOXAPHENE (CHLORINATED CAMPHENE)	05/29/2018	06/14/2020	N	SPE	NE
Method Code: 10107401 Method Ref: EPA 625		Revision:		Date: 1984		
6285	HEXACHLOROCYCLOPENTADIENE	01/19/2018	06/14/2020	N	SPE	NE

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Method Code: 10296614		Method Ref: EPA 608.3 GC-ECD		Revision:		Date: 2016	
7355	4,4-DDD	08/13/2019	06/14/2020	N	SPE	NE	
7360	4,4-DDE	08/13/2019	06/14/2020	N	SPE	NE	
7365	4,4-DDT	08/13/2019	06/14/2020	N	SPE	NE	
7025	ALDRIN	08/13/2019	06/14/2020	N	SPE	NE	
7110	ALPHA-BHC (ALPHA-HEXACHLOROCYCLOHEXANE)	08/13/2019	06/14/2020	N	SPE	NE	
7115	BETA-BHC (BETA-HEXACHLOROCYCLOHEXANE)	08/13/2019	06/14/2020	N	SPE	NE	
7250	CHLORDANE (TECH.)	08/13/2019	06/14/2020	N	SPE	NE	
7300	CHLORPYRIFOS	08/13/2019	06/14/2020	N	SPE	NE	
7925	CIS-NONACHLOR	08/13/2019	06/14/2020	N	SPE	NE	
7105	DELTA-BHC	08/13/2019	06/14/2020	N	SPE	NE	
7470	DIELDRIN	08/13/2019	06/14/2020	N	SPE	NE	
7510	ENDOSULFAN I	08/13/2019	06/14/2020	N	SPE	NE	
7515	ENDOSULFAN II	08/13/2019	06/14/2020	N	SPE	NE	
7520	ENDOSULFAN SULFATE	08/13/2019	06/14/2020	N	SPE	NE	
7540	ENDRIN	08/13/2019	06/14/2020	N	SPE	NE	
7530	ENDRIN ALDEHYDE	08/13/2019	06/14/2020	N	SPE	NE	
7535	ENDRIN KETONE	08/13/2019	06/14/2020	N	SPE	NE	
7120	GAMMA-BHC (LINDANE)	08/13/2019	06/14/2020	N	SPE	NE	
7685	HEPTACHLOR	08/13/2019	06/14/2020	N	SPE	NE	
7690	HEPTACHLOR EPOXIDE	08/13/2019	06/14/2020	N	SPE	NE	
7810	METHOXYCHLOR	08/13/2019	06/14/2020	N	SPE	NE	
8250	TOXAPHENE (CHLORINATED CAMPHENE)	08/13/2019	06/14/2020	N	SPE	NE	
7910	TRANS-NONACHLOR	08/13/2019	06/14/2020	N	SPE	NE	
Method Code: 10300024		Method Ref: EPA 625.1		Revision:		Date: 2016	
6285	HEXACHLOROCYCLOPENTADIENE	08/13/2019	06/14/2020	N	SPE	NE	
Method Code: 10296614		Method Ref: EPA 608.3 GC-ECD		Revision:		Date: 2016	
3890	OXYCHLORDANE	08/13/2019	06/14/2020	N	AIR	NE	
Method Code: 10215608		Method Ref: EPA 2021.0 - DAPHNIA PULEX, 48-HR ACUTE, NONRENEWA		Revision: 5TH ED		Date: 2002	
3355	DAPHNIA PULEX	09/26/2008	06/14/2020	N	TOX	NE	
Method Code: 10216407		Method Ref: EPA 2006.0 EPA/821/R-02/012		Revision: 5TH ED		Date: OCT-02	
3380	MENIDIA BERYLLINA (INLAND SILVERSIDE)	09/26/2008	06/14/2020	N	TOX	NE	
Method Code: 10252605		Method Ref: EPA 1000.0 - FATHEAD MINNOW CHRONIC TOXICITY		Revision: 4TH ED		Date: 2002	
3410	PIMEPHALES PROMELAS (FATHEAD MINNOW)	09/26/2008	06/14/2020	N	TOX	NE	
Method Code: 10252809		Method Ref: EPA 1001.0 EPA/821/R-02/013		Revision: 4th ED		Date: OCT-02	
3410	PIMEPHALES PROMELAS (FATHEAD MINNOW)	09/26/2008	06/14/2020	N	TOX	NE	

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29 Hazen Drive, PO Box 95, Concord, NH 03302 (603) 271-2998

PRIMARY ACCREDITATION ANALYTE LIST

ANALYTE LIST NUMBER: 151319-B



ENTHALPY ANALYTICAL LLC
1 LAFAYETTE RD UNIT 6

HAMPTON NH 03842
603-926-3345
Lab ID: 1513



Method Code: 10253006	Method Ref: EPA 1002.0 - CERIODAPHNIA DUBIA CHRONIC TOXICITY	Revision: 4TH ED	Date: 2002
3315	CERIODAPHNIA DUBIA (DAPHNID)	09/26/2008	06/14/2020 N TOX NE
Method Code: 10253200	Method Ref: EPA 1003.0 EPA/821/R-02/013	Revision: 4th ED	Date: OCT-02
3420	SELENASTRUM CAPRICORNUTUM (GREEN ALGA)	09/26/2008	06/14/2020 N TOX NE
Method Code: 10253802	Method Ref: EPA 1006.0 EPA/821/R-03/014	Revision: 3rd ED	Date: OCT-02
3380	MENIDIA BERYLLINA (INLAND SILVERSIDE)	09/26/2008	06/14/2020 N TOX NE
Method Code: 10254009	Method Ref: EPA 1007.0 EPA/821/R-03/014	Revision: 3rd ED	Date: OCT-02
3395	MYSIDOPSIS BAHIA (MYSID)	09/26/2008	06/14/2020 N TOX NE
Method Code: 10254203	Method Ref: EPA 1008.0 EPA/821/R-03/014	Revision: 3rd ED	Date: OCT-02
3305	ARBACIA PUNCTULATA (SEA URCHIN)	09/26/2008	06/14/2020 N TOX NE
Method Code: 10264809	Method Ref: EPA 2000.0 - FATHEAD MINNOW ACUTE TOXICITY	Revision: 5TH ED	Date: 2002
3410	PIMEPHALES PROMELAS (FATHEAD MINNOW)	09/26/2008	06/14/2020 N TOX NE
Method Code: NH0113	Method Ref: EPA 2019.0 EPA/821/R-02/012	Revision: 5TH ED	Date: OCT-02
3405	ONCORHYNCHUS MYKISS (RAINBOW TROUT)	09/26/2008	06/14/2020 N TOX NE
3415	SALVELINUS FONTINALIS (BROOK TROUT)	09/26/2008	06/14/2020 N TOX NE
Method Code: NH0114	Method Ref: EPA 2007.0 EPA/821/R-02/012	Revision: 5TH ED	Date: OCT-02
3395	MYSIDOPSIS BAHIA (MYSID)	09/26/2008	06/14/2020 N TOX NE
Method Code: NH0116	Method Ref: EPA 2002.0 EPA/821/R-02/012	Revision: 5TH ED	Date: OCT-02
3315	CERIODAPHNIA DUBIA (DAPHNID)	09/26/2008	06/14/2020 N TOX NE

Bill Hall
ENTHALPY 8/14/2019

Bill Hall
NH ELAP Program Manager
Issue Date: 08/14/2019

Matrix Legend: AE=Air; BT=Tissue; D=Drinking Water; N=Non-Potable Water; SC=Solid and Chemical Materials

Category Legend: MIC=Microbiology; MET=Metals; NMI=Non-Metal Inorganics; PRE=Preparation; VOC=Volatile Organic Compounds; SBN=SVOC-BNA; SHE=SVOC-Herbicides; SNO=SVOC-NOS; SPC=SVOC-PCB; SPE=SVOC-Pesticides; RAD=Radiochemistry; WET=Wet

Accreditation Legend: NE=NELAP; NH=NH State Certification; CE=State Certification; IN=Interim (NELAP); WI=Withdrawn; AP=Applied; RE=Revoked; SU=Suspended

This analyte list supersedes all previously issued analyte lists. Method accreditation does not imply acceptance for NHDES compliance testing. Laboratory is required to use EPA-approved methods required by regulation. Continuing accreditation status is dependent on successful ongoing participation in the program. Customers may verify the laboratory's current accreditation status by calling (603) 271-2998 or by visiting the NH ELAP website (<https://www.des.nh.gov/organization/divisions/water/dwgb/nhelap/index.htm>)



State of Rhode Island and Providence Plantations
DEPARTMENT OF HEALTH
Certifies

LAO00358

ENVIROSYSTEMS ON AFFILIATE OF ENTHALPY ANALYTICAL
PO BOX 778
HAMPTON NH 03843
Laboratory Director: JASON HOBBS

for the analysis of: Non-potable Water Organic Chemistry - Non-potable Water Inorganic Chemistry -

This certificate is issued, pursuant to Rhode Island General Laws 23-16.2 and supersedes all previous Rhode Island certificates issued to this laboratory. Certification is no guarantee of the validity of the laboratory results.

This certificate is valid only when accompanied by the certificate and list of analytes and methods for which certification has been granted based upon the following out of state certification(s):

Certifying Authority
NH

Certification Number
151318

Expiration Date
06/14/2019

ENVIROSYSTEMS ON AFFILIATE OF ENTHALPY ANALYTICAL is responsible for maintaining each of the certifications listed above. Failure to notify the Laboratory Certification Officer of any change in the status of these certifications may result in the suspension or revocation of certification. Contact the Laboratory Certification Officer to verify the current certification status of this laboratory.

Nicole Alexander-Scott, MD, MPH
Director of Health

Expires: 12/30/2019

THIS CERTIFICATE IS TO BE CONSPICUOUSLY DISPLAYED AT THE LABORATORY IN A LOCATION VISABLE TO THE PUBLIC