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Quality Assurance Plan

Analytical Laboratory Services, Inc.

Environmental Program
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3. Quality Assurance Program Plan Identification Form

Document Title:	Quality Assurance Plan
Organization Title:	Analytical Laboratory Services, Inc.
Organization Unit:	Environmental
Address:	34 Dogwood Lane Middletown, PA 17057
Phone:	(717) 944-5541 (717) 944-1430 fax

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4. Quality Policy and Objectives

The main objective of Analytical Laboratory Services, Inc. (ALSI) is to provide our Customers with high quality laboratory services. We are dedicated to providing our Customers with analytical data and services that conform to ISO Guide 17025 requirements and to continually improving the effectiveness of the quality system. This Quality Assurance Plan details facilities, personnel and equipment necessary for accomplishing this objective along with general procedures and practices, which will be followed to maintain adherence to this objective.

There is a firm commitment from all members of this laboratory to follow a comprehensive Quality Assurance Plan (QAP). This commitment and dedication to quality is fully supported and communicated from management to the bench level through our policies in order to meet the objectives of our analytical laboratory and best serve our Customers. The following Quality Assurance Plan is an embodiment of the current practices of quality assurance/quality control implemented by Analytical Laboratory Services, Inc. to ensure the production of accurate, consistent data of known quality. The stated policies and procedures meet the requirements of all certifications/accreditations currently held by the laboratory, including the most current NELAC standards and the Department of Defense (DoD) QSM, Version 3.

ALSI's approach to Quality Assurance starts with the President who delineates policy and sets goals in conjunction with senior management personnel. Management staff and laboratory personnel implement policies. Each department assists in the process by providing assessment of operating procedures along with recommendations for improvements or corrections. All personnel are aware of the relevance and importance of their activities and how they contribute to the overall achievement of the objectives of the quality system.

Secondly, a Quality Assurance Manager, who reports directly to the President, oversees prevention, assessment and control procedures for the analytical laboratory and various associated departments within the organization. These three functions, prevention, assessment and control, comprise the foundation of the laboratory's approach to Quality Assurance.

In addition to implementing the policies and practices established in the QAP, each laboratory section is responsible for keeping an updated version of Standard Operating Procedures (SOPs) applicable to their section to ensure continuity of analysis throughout the laboratory. Specifics in the areas such as sample handling, instrument calibration, quality control measures, data acquisition and data processing are thoroughly outlined and explained in each SOP. By continuously updating and following the guidelines stated in the QAP and SOPs, the laboratory is able to generate data of consistently high quality.

Existing in conjunction with the quality program at ALSI is a comprehensive ethics program. This ensures the prevention of data quality compromise. Each employee is expected to maintain a firm commitment to comply with all applicable laws and regulations, and to conduct business in accordance with the letter, spirit, and intent of all relevant laws and to refrain from any illegal, dishonest, or unethical conduct. ALSI's business and ethics policy is outlined in the employee handbook and ALSI Ethics Credo that each employee must read and agree to as a condition of his or her initial employment. Documentation that each employee has read and understands the significance of the Ethics Credo becomes part of an individual's training records. Thereafter, on an annual basis each employee is required to review the Ethics Credo and signs off on the Employee Training History form as part of their permanent training record.

The policies and practices of quality assurance/quality control presented in the following text are set forth as minimums. Any additional measures that a project or investigation requires can be incorporated into the project specific Quality Assurance Project Plan (QAPP).

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Separate Microbiological and Field Sampling Quality Assurance Plans have been established. These plans should be referred to for the specific quality control procedures required for the microbiology and field services departments.

5. Organization and Management Structure

5.1. Ownership

Analytical Laboratory Services, Inc. (ALSI) is incorporated under the laws of the State of Pennsylvania and is privately owned.

5.2. Organizational Structure of Personnel

See Appendix A for ALSI's Organizational Chart, which is structured by Position and Department.

5.3. Job Descriptions

5.3.1. President

Responsibilities:

- Insure commitment to compliance with the standards as stated in ISO 17025.
- Direct the day-to-day operations and management of the laboratory.
- Guide Sales & Marketing activities.
- Provide senior management with timely information about business matters, which include financial, sales, marketing, personnel, capital expenditures, safety, and quality issues.
- Guarantee quality in the services provided by the laboratory.
- Insure the financial health of the laboratory.

Requirements:

- Education: A four-year college degree from an accredited educational institution or equivalent.

Experience:

- A minimum of five years nonacademic experience.

5.3.2. IT Director

Reports To:

- President

Responsibilities:

- Insure commitment to compliance with the standards as stated in ISO 17025.
- Direct the work of systems analysts, computer programmers, support specialists, and other computer-related workers.
- Plan and coordinate activities such as installation and upgrading of hardware and software, programming and systems design, development of computer networks, and implementation of Internet and Intranet sites.
- Provide day-to-day onsite administrative support for software users in a variety of applications.
- Maintain network hardware and software, analyze problems, and monitor the network to ensure its availability to system users.

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- Gather data to identify customer needs and then use the information to identify, interpret, and evaluate system and network requirements.
- Provide custom programming, reports and electronic deliverables to meet the requirements of in-house staff and external customers.
- Implement and monitor software security systems which will maintain the integrity of computer programs and data on the hard disk files of the lab's server and the hard drives of individual machines.
- Establish, implement and maintain the tests disaster recovery procedures for information resources.
- Provide technical support in evaluating, selecting, implementing, and maintaining systems and application software.
- Develop and implement office automation systems.

Requirements:

- Education: A four-year college degree from an accredited educational institution in chemistry or a related science or equivalent.

Experience:

- A minimum of three years nonacademic laboratory experience.

Deputy:

- In the absence of the IT Director, these job responsibilities will be distributed among the IT staff.

5.3.3. Operations Manager

Reports To:

- President

Responsibilities:

- Insure commitment to compliance with the standards as stated in ISO17025.
- Manage all analytical and reporting activities for Metals, Inorganic Prep, Water Quality, and Microbiology.
- Manage and provide daily guidance for all laboratory activities.
- Serve as a liaison between analytical and other departments.
- Monitor turnaround time and resources.
- Implement QA directives and corrective actions.
- Address suggestions and concerns of clients and external auditors.
- Approve the purchase of equipment, instrumentation, and laboratory supplies.
- Recruit, hire, and train a sufficient number of qualified personnel.
- Ensure that a proper training program exists for chemists and technicians.

Requirements:

- Education: A four-year college degree from an accredited educational institution in the chemical, environmental, biological sciences, physical sciences or engineering, with at least 24 credit hours in chemistry.

Experience:

- A minimum of two years experience in the environmental analysis of organic and inorganic analyses for which the laboratory maintains accreditation.

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Deputy:

- In the absence of the Laboratory Operations Manager, the Technical Director will assume the above responsibilities.

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5.3.4. Quality Assurance/Quality Control Manager

The Quality Assurance Manager operates independently of all data generating areas.

Reports To:

- President

Responsibilities:

- Insure commitment to compliance with the standards as stated in ISO17025.
- Serve as the focal point for QA/QC in the laboratory.
- Maintain an adequate and current quality assurance plan.
- Monitor the QA program as documented in the QA plan and ensure all elements are carried out as written.
- Conduct scheduled and unscheduled audits and inspections and report findings to management.
- Ensure that current SOPs are available for all methods and that they conform to recognized standards.
- Prepare project specific quality assurance plans s as needed.
- Coordinate performance evaluation and proficiency testing samples.
- Introduce "blind" PE samples.
- Maintain a record of deficiencies or "out of control" events and any corrective actions taken.
- Oversee and/or review quality control data.
- Evaluate data objectively and perform assessments without outside (e.g., managerial) influence.

Requirements

- Education: A four-year college degree from an accredited educational institution in a basic or applied science or equivalent.

Experience:

- A minimum of one-year nonacademic laboratory experience.
- The Quality Assurance Manager shall have a general knowledge of the analytical methods for which data review is performed.

Deputy:

- In the absence of the Quality Assurance Manager, the Technical Director will assume the above responsibilities.

5.3.5. Technical Director

Reports To:

- President

Responsibilities:

- Insure commitment to compliance with the standards as stated in ISO17025.
- Manage all analytical and reporting activities for GC, GC/MS, and Organic Preparation.

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- Responsible for scientific and technical issues.
- Provide customer support with regard to technical issues.
- Final authority and responsibility with regards to implementation of new analytical procedures and instrumentation.
- Responsible for reviewing analytical reports.
- Approve changes in the analytical testing programs,
- Supervise method development and assists in method implementation.
- Supervise instrument maintenance and repair.
- Implement corrective actions involving instrument problems.
- Manage non-routine projects.
- Represent the laboratory at conferences and regulatory seminars.

Requirements:

- Education: A four-year college degree from an accredited educational institution in Chemistry or a related science or equivalent.

Experience:

- A minimum of two years nonacademic laboratory experience.

5.3.6. National Accounts Manager

Reports To:

- President

Responsibilities:

- Develop and implement new goals and objectives to drive sales and increase profits including both a strategic and tactical sales marketing plan to accomplish new objectives.
- Continued development of the company's established customer base by managing and maintaining corporate relationships and contract renewals and by cultivating and growing relationships that will increase existing business and ensure excellent client relations.
- Gather, organize and analyze information of all national accounts within new geographic areas in an effort to create a business plan of growth for a specific area.
- Manage the day-to-day functions of the marketing team:
    - Develop and execute sales and strategies for each territory to include specific account penetration, negotiation, and maintenance techniques.
    - Monitor production and achievement of sales quotas.
    - Motivate and provide training and support through the development of sales programs, promotions and education.
    - Assist in the development of sales proposals and RFPs.
- Provide updates, sales and expense reports to the President.
- Assist the Accounting Department and Project Manager/Project Coordinators in customer issue resolution.
- Maintain knowledge of relevant environmental criteria and guidelines.
- Maintain knowledge of laboratory capabilities and service offerings.
- Prepare and deliver sales presentations that address the customer's need and leads to sales growth within established and new accounts.
- Manage sponsorship, events programs and trade shows to promote the laboratory and its capabilities.

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Requirements:

- Education: Completion of a university degree and/or college level Chemistry program or equivalent.

Experience:

- A minimum of three (3) years related Environmental Chemistry experience.
- A minimum of three (3) years related sales experience.

5.3.7. Controller

Reports To:

- President
- Shareholders
- Board of Directors

Responsibilities:

- Insure the profitability of the Company.
- Enhance shareholder stock value.
- Manage the day-to-day operations of the Accounting Department.
- Coordinate the financial transactions of all Company locations.
- Provide financial performance information to the appropriate parties.
- Review vendor contracts and negotiate terms and pricing with vendors.
- Monitor customer performance and coordinate collection efforts.
- Perform quarterly and annual tax position evaluations for shareholders.
- Perform all Human Resource related responsibilities of the Company.

Requirements:

- Education: A four-year college degree from an accredited educational institution.

Experience:

- A minimum of three (3) years with a CPA firm
- A minimum of five (5) years in a senior level Accounting manager position.

5.3.8 Project Manager

Reports to:

- President

Responsibilities:

- Primary point of contact to coordinate, manage and provide timely responses to customer inquiries related to the management of projects and status of work in progress-from the beginning of sample collection to the final report submission.
- Review initial QAPP (if required) and at job start-up, review all data information including Chain-of-Custody (COC) forms, accuracy of COC entry, sample acknowledgement forms, final results with QC results, and will coordinate the final laboratory report submission including EDDs and data deliverable packages.
- Available to client on a day-to-day basis to provide scheduling associated with sample collection, sample containers/bottle specifications, shipping containers, receipt of samples, appropriate turnaround times/due dates, project planning, and final report requirements.

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- Maintain a general working knowledge of analytical methods, method updates, and method usage in order to monitor compliance with industry and local/sate/federal regulations.
- Work with Account Executives, laboratory management and operations staff to meet customer requirements and resolve service and technical issues during every phase of the project. Facilitate corrective action when needed.
- Define project requirements to ensure all contract requirements are met and communicate requirements to appropriate personnel. Work closely with internal sample receiving personnel to ensure proper receipt, login, and subcontracting of samples, when required.
- Supervise and provide guidance to project coordinators in all area of customer service and project management.

Requirement:

- Education: Completion of a university degree and/or college level Chemistry program or equivalent.

Experience:

- A minimum of five (5) years related Environmental Chemistry experience.

5.3.9. Laboratory Supervisor

Reports to:

- Operations Manager

Responsibilities:

- Review all technical information that originates in their department.
- Ensure that analysts perform QC checks at required intervals and that all required criteria are met.
- Responsible for documenting all analytical and operational activities in their departments.
- Train analysts working in their department and maintain all documentation to assure their training and competency.
- Prepare and update SOPs.
- Ensure that method detection limit studies are performed on an annual basis.

Requirement:

- Education: A bachelor's degree in a relevant scientific field or equivalent experience.

Experience:

- A minimum of two years of nonacademic experience in relevant analyses.
- A supervisor shall be familiar with relevant test methods and associated calibrations.

5.3.10. Laboratory Analyst

Reports To:

- Laboratory Supervisor

Responsibilities:

- Follow appropriate methodologies, running QC checks as required.
- Evaluate the results of QC samples.

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- Identify and report quality problems to the supervisor or QA Manager.
- Document activities and report results in a concise and accurate manner.
- Supervise a small group of technicians engaged in performing routine laboratory and fieldwork.

Requirements:

- Education: A bachelor's degree in a relevant scientific field or equivalent experience.

5.3.11. Laboratory Technician

Reports To:

- Laboratory Supervisor

Responsibilities:

- Follow appropriate methodologies, running QC checks as required.
- Evaluate the results of QC samples.
- Identify and report quality problems to the supervisor or QA Coordinator.
- Document activities and report results in a concise and accurate manner.

Requirements:

- Education: High School graduate or equivalent. Two years of education in physical or environmental science and/or two or more years work experience in a testing laboratory.

5.3.12. Laboratory Assistant

Reports To:

- Laboratory Supervisor

Responsibilities:

- Follow appropriate methodologies, running QC checks as required.
- Document activities and report results in a concise and accurate manner.

Requirements:

- Education: High school graduate or equivalent

5.4. Safety

ALSI is conscious of providing a safe and healthy work place for its employees. This is accomplished by adequate safety training for all personnel. Employees receive all the necessary safety training and information to meet the guidelines established by the Occupational Safety and Health Administration (OSHA). ALSI complies with the "Right-to-Know" laws established by the federal government.

ALSI's safety committee is responsible for maintaining the Material Safety Data Sheets (MSDS) within the laboratory facility and organizing continued safety training for all employees. The safety committee performs inspections of the facilities for compliance with safety regulations and verifies that all safety equipment is in good working condition.

It is ALSI's policy that safety glasses or splash goggles and lab coats be worn by every person entering designated laboratory areas and no food or beverages are allowed to be brought into these areas. All accidents that occur in the laboratory that involve personal injury or that could potentially have involved

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personal injury are reported on OSHA Form 301. The pertinent information pertaining to the incident is maintained on the form. This includes the date that the incident occurred, the person(s) involved, details of the incident, and information about the physician or health care professional, if required. A record of these reports is kept by the safety committee and summarized annually on OSHA Form 300. This summary form is posted on the Health and Safety bulletin board during the month of April each year.

ALSI maintains a Chemical Hygiene Plan (CHP), which details the safety policies of the laboratory. This manual is read and signed-off as understood by all employees following their initial orientation. These records can be found in the individual's training records maintained by the QC department.

6. Training

6.1. Personnel Files

The Controller maintains a file for each individual. Annual reviews of technical competence, achievements, and problems noted shall be maintained in this file.

6.2. Technical Training

All employees involved with the handling of samples, manipulation or generation of data or operation and maintenance of equipment used in sample processing must maintain training records. Training records are maintained in the QA Department. Evidence of Ethics Training, short courses or seminars attended along with a resume are also kept on file in the Quality Assurance Department. Any accreditation or certification maintained by an individual, who affords the laboratory certification, shall also be stored in these training files. Demonstration that each employee has read, understands, and is using the latest version of the laboratory's in-house quality manual can be found in these files on the *Employee Training History Form.* Instructions on required training documentation are included in ALSI's Standard Operating Procedure, 99-Train. Initial Demonstration of Capability as well as annual Demonstration of Continual Proficiency including certification that technical personnel have read, understood, and agreed to perform the most recent version of the SOP are required to be documented and to be approved by the Technical Director and the QA Manager. Other measures of proficiency included in these logs will be reviewed and signed by an appropriate supervisor at regular intervals. If an employee terminates his/her employment, their training records will be archived for a minimum of ten (10) years. All employees are required to review their training records on a regular basis, and to ensure they are up to date and properly archived.

The training required to perform independently within the organization varies considerably from task to task. Ultimately, the personal judgment of an employee's direct supervisor shall determine his or her ability to work alone. Demonstration of proficiency as well as training with and observation by competent co-workers or supervisors is the foundation of the training program. Documentation of training and evaluation of measures of proficiency are essential to the training program.

Once an employee has demonstrated acceptable proficiency as described, it is implied that he or she has also demonstrated a minimum level of qualification, experience, and skills necessary for working in the lab. This may include, but is not limited to, basic lab skills such as using a balance, using appropriate glassware, and using qualitative and quantitative techniques.

6.3. Method Specific Training

An analyst or technician in training may perform work on samples submitted for analysis as long as the employee is placed with an experienced analyst who will oversee the preparation and/or analysis. When an Initial Demonstration of Capability is completed, the SOP has been reviewed and sufficient training is documented in the individual's training records, the employee may work independently.

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6.4. Minimum Experience and Training

In addition to the requirements listed in sections 5.3.1 through 5.3.8 persons hired for the following job functions must meet the following minimum experience and training requirements before working independently in these areas, unless a supervisor or designee is available for consultation.

- Inductively coupled plasma-emission (ICP) spectroscopy: One year experience with satisfactory completion of a short course on ICP or equivalent in-house training.
- Flameless atomic absorption spectroscopy: One year experience with satisfactory completion of a short course on graphite furnace atomic absorption (GFAA) or equivalent in-house training.
- Flame atomic absorption (FLAA) spectroscopy: One year experience with satisfactory completion of a short course on FLAA or equivalent in-house training.
- Gas chromatography: One year experience with satisfactory completion of a short course on basic GC or equivalent in-house training.
- Mass spectrometry: One year experience with satisfactory completion of a vendor's training course, professional sponsored short course or equivalent in-house training.
- Mass spectra interpretation: One year experience with satisfactory completion of a vendor's training course, professional sponsored short course or equivalent in-house training.
- General chemistry and instrumentation: Six months experience.
- Sample collection: Six months experience.

7. Document Control

Record keeping is extremely critical in an environmental laboratory to assure the validity of the data produced. ALSI produces two types of records: computerized records and hardcopy records. The record keeping system allows for historical reconstruction of all laboratory activities that produced the analytical data.

7.1. Computer Records

Computerized records include those generated by the entry of information into the Laboratory Information Management System (LIMS). Information entered into the laboratory computer system is saved daily on hot swappable media. This is accomplished through a "back-up" which is performed each night. Back-ups are kept in a fireproof safe located in the field sampling building, which is not attached to the main building. A member of the IT Department may initiate retrieval and printing of these records.

7.2. Hardcopy Records

Hardcopy records produced by the laboratory are a combination of forms, reports and logbooks. Chain of custody records and other project or sample information are stored in individual customer files and are maintained by administrative personnel. The Lab Analysis Reports for all Customer samples are stored on the network in PDF format and are backed-up in the same way as all other electronic data. At the end of each calendar year, the individual file records are moved from this office to an off-site storage warehouse where these records shall be protected from loss, damage, misuse, or deterioration. All records are kept for a minimum of five (5) years, or longer if requested by the Customer. Records are filed in this facility alphabetically and chronologically in order to permit retrieval when required. Access to archived information is controlled and documented with an access log filed with the document storage facility. A copy of the access log is maintained by the ALSI Accounting Department who is responsible for contacting the storage facility for document retrieval Data, which are expected to become part of a legal action, may be maintained for a longer period of time dependent on legal counsel. Filing, copying and maintaining legible hardcopy records is the responsibility of the Customer Service Representatives and the Department Supervisors.

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7.3. Hardcopy Laboratory Logbooks

Laboratory logbooks are bound, sequentially numbered documents used to record specific information related to sample receipt, preparation, and analysis. This information may include, but is not limited to, preservation records, instrument maintenance, sample measurement data, etc. All laboratory logbooks are assigned and labeled with a unique identification number before being placed into use. This provides a system for direct document control and tracking. The supervisor of each department is responsible for the storage and retention of any logbooks used in their department.

Laboratory logbooks are kept in the laboratories until filled or no longer in use. Once a logbook is "retired" or no longer in use, it is also placed into storage. This includes the logbooks assigned to individual analysts, those in which instrument maintenance, calibrations, etc. were recorded, reference material notebooks, sample preservation notebooks and all other bound materials generated by the laboratory. Laboratory logbooks are kept for a minimum of ten (10) years by the laboratory.

7.4. Hardcopy Laboratory Worksheets

Laboratory worksheets are forms used to document information relating to laboratory sample analysis processes. The forms vary and are used throughout the laboratory. Each form is controlled by the quality control department and tracked by assigning each a dated revision number. This ensures that any changes made to the forms are documented, and each revision is appropriately dated.

7.5. Raw Data

Raw instrument data are generated daily in each department of the laboratory. Raw data include all original observations, calculations and derived data, calibration records and a copy of the test reports. All raw data generated is stored in each individual department for a period of time judged sufficient by the supervisor of that department. The data is then transferred to labeled file boxes affixed with barcodes identifying the contents, and held in locked storage areas until transferred to a facility that enables us to store the data under conditions established by the regulatory authorities. These records are stored for a minimum of five (5) years from generation of the last entry in the records, with the exception of environmental lead data, which is retained for a minimum of ten (10) years from generation of the last entry in the records. Additionally, raw data is maintained in electronic format, and is backed-up in the same way as all other electronic data..

7.6. Data Deliverable Packages

All Deliverable Packages are reviewed and validated by the Quality Control Department prior to submission to the Customer. The Customer receives the original and a CD Rom of all raw data, quality control summary forms, and associated shipping documents. A copy of the original data package is retained by ALSI in PDF format..

7.7 Quality Control Summary Packages

QC Summary Packages are generated from the Horizon LIMS and contain sample results, in addition to a QC summary report of batch QC results. QC results include blank, Laboratory Control Sample, batch matrix spike and matrix spike duplicate results, surrogate recoveries, Relative Percent Difference (RPD), and percent recoveries. QC Summary Packages are stored on server space on the ALSI network and are accessible only by original generator of the data.

7.8. Quality Assurance Documents

Control of quality assurance documents is to be maintained by the Quality Assurance Department. Quality assurance plans and standard operating procedures are subject to the following requirements.

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1. The ALSI Quality Assurance Plan must be signed and approved by the President, Technical Director, Operations Manager, and the Quality Assurance Manager.

2. All ALSI Standard Operating Procedures (SOPs) must be signed and approved by the Quality Assurance Manager and Department Supervisor or designee.

3. The QA Plan and SOPs must have document control information placed in the upper right hand corner of each document page. The information required is the document name, revision number, date generated, and page number. (See upper right hand corner of this page for format.) The first page of the document will then be stamped with an "effective date". The document name of an SOP will consist of the ALSI department number and a unique code to be determined by the department supervisor. For example, a hexavalent chromium SOP, written by the Wet Chemistry Department, may have the name 04-CR+6.

4. The QA Plan and SOPs must have an Identification Form at the beginning of the document. The Identification Form will contain the document title, the document control number, the organization title and the appropriate signatures required for approval and annual review/approval.

5. Reproduction and distribution of the QA Plan and SOPs is to be handled by the Quality Assurance Department. The original documents will be filed in the Quality Assurance Department. Documents to be distributed will be given a control number and will be listed in the Controlled Document Logbook. Employees will then sign and date the logbook when they receive a controlled document. Every time a controlled copy is produced from a master document the following stamp is used to mark all pages of the document:

CONTROLLED DOCUMENT
DO NOT DUPLICATE
If this stamp is not colored red, this is not a controlled copy

6. When a document has been revised, the old revision will be collected, the date returned will be recorded in the logbook and the new revision will be issued following the same procedure. The original copy of the superseded document will be kept in the Quality Assurance office and will be stamped "SUPERSEDED BY REVISION", directly on the sleeve and on the cover page of the SOP, with the new revision number written in. All other copies will be disposed of.

7. Any employee receiving a controlled document will be responsible for that document and the information contained in that document. Employees need to assure its safekeeping. If a controlled document is lost or damaged, the Quality Assurance Manager shall be notified immediately so it can be noted in the controlled document logbook and a new document issued.

8. All employees receive access to a controlled copy of the most recent revision of the QA Plan through their department SOP manual. The QA Plan is treated in the same manner as an ALSI SOP and as such, is distributed to each department as a controlled document, signed off by the department head or designee, placed with the department SOPs and is accessible to all departmental employees.

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9. Laboratory supervisors or their designees are responsible for validating and reviewing SOPs annually for revision as required (i.e. methods are updated by EPA, new instrumentation is purchased, etc.). Revisions of SOPs must be submitted to the Quality Control Department for administrative validation and approval before they are initiated within the department.

10. If it is necessary to make a change in a controlled document before a new revision is created, the change shall be entered by hand in the document by a supervisory or managerial employee, and the change initialed and dated. All controlled copies of that document shall be changed in this manner. The document shall then be submitted to the Quality Assurance Department for revision.

11. The QC Department is responsible for the annual review and revision of the QA Plan. This requires updating procedures, replacing obsolete documents, and presenting regulatory updates as necessary.

7.9. External Documents

The Quality Control Department has established a procedure for maintaining control of all external documents that form part of its quality system. The external documents include sources such as regulations, standards, test methods, instrument manuals, textbooks, and journals. An inventory list has been established that organizes these documents by department, and assigns a unique identification number to each for easy reference. It is the responsibility of the Quality Control Department to review this inventory list and to update these reference materials annually.

A listing of methodologies routinely used at Analytical Laboratory Services is given in Section 14.1 of this Quality Assurance Plan. The current versions are maintained by checking Federal and State websites for the latest updates. A list of all currently controlled documents is available and updated as these revisions are implemented within the laboratory.

Originals for all accreditations/certifications are displayed in the reception area of the laboratory as required by Federal and State regulatory agencies. Copies of these documents are maintained in the QC Department, and distributed to Sales and Customer Services in order to assist them in responding to Customer requests. This information can also be found on our website at www.analyticallab.com.

Documents determined to be outdated, but retained for knowledge preservation will be marked as "obsolete". References removed from the Quality Assurance Department, for use by laboratory personnel, must be signed-out in the *Reference Library Logbook* and signed back in upon its return.

8. Traceability of Measurement

The laboratory has an established program for achieving measurement traceability for the calibration, verification and maintenance of its measuring and testing equipment. This includes balances, thermometers and all reference standards.

Calibration laboratories, accredited to ISO/IEC 17025 by a recognized Accreditation Body, will conduct the calibrations and verifications of measuring and test equipment, reference standards, and reference materials used in laboratory operations. This Accreditation Body will issue an accredited test report containing appropriate statements of measurement results, and measurement uncertainty. The calibrations or verifications will be documented in a calibration certificate or report endorsed by a recognized accreditation body's logo, or its accredited status referenced through a statement and indicating their certificate number.

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Calibration of all laboratory balances is performed annually and contracted to Mettler-Toledo, Inc., 1900 Polaris Parkway, Columbus, OH 43240. Calibration of all Class "1" weights is performed every five years and contracted to Troemner, 201 Wolf Drive, Thorofare, NJ, 08086-0087. Calibration of all in-house thermometers is performed annually against a NIST certified thermometer. The calibration of the NIST certified thermometer is performed every three years by ICL Calibration Laboratories, Inc., 1501 Decker Avenue, Stuart, FL 34994.

All certificates of calibration for the balances, weights, and thermometers are kept on file in the QA Department for review by management and all regulatory agencies. Certificates for reference standards are maintained by the supervisors of each department.

8.1. Reagents

Reagent quality is of extreme importance to laboratory results. All chemicals and reagents used in the laboratory meet purity and traceability requirements specified in the individual methods. Each laboratory area has standard operating procedures, which define the quality of reagents being used. It is the responsibility of the supervisor of each area to requisition reagents of required quality. All purchased reagents are delivered to the Sample Receipt Area to be unpacked, verified for accuracy against the invoice, and labeled with a unique reference ID number. This reference ID number is then electronically recorded in the Chemical Reagent Logbook (See example, Figure 1) along with the chemical name, manufacturer, lot number, date received, receiver's initials, expiration date, number of bottles, and storage location. The storage of chemicals is governed by the manufacturer's recommendations and by the analytical procedures for which the chemicals are used. Purchased reagents are to be labeled with the reference ID number, date opened, expiration date, and initials of the analyst opening the reagent. For solid stock chemicals that do not list a supplier expiration date, ALSI will label these chemicals with an expiration date of 5 years from the date of receipt.

Verification that the chemical or reagent purchased is of the correct purity and traceability before being put into use is the responsibility of the supervisor of the department in which the reagent will be used. The preparation of working reagents is recorded in bound logbooks. These logbooks document the name of the reagent, reference ID number, and the concentration of the reagent, the reference number(s) of the stock reagent(s) used as well as the dilutions performed, date of preparation, date of expiration, and initials of the preparer. The container holding the working reagent is labeled with the reference ID number, initials of the preparer, the date of preparation, and the expiration date as determined by the method. Any health and/or safety concerns are also listed on the container.

Each lot of chemical or reagent used is monitored and controlled for any unusual contaminants that interfere with analysis as evident in results of prescreens and/or method and reagent blanks. If a working reagent is found to be suspect, it is removed from use and traced back to the original lot number, which is then investigated. If the stock reagent is found to be the source of the problem, it is completely removed from use. Any samples contained in batches in which the suspect reagent was used for analysis will be reanalyzed if sufficient remaining sample allows, or flagged with a comment on the report. The corrective action process described in Section 18.0 of this manual is used to document these assessments.

8.2. Reference Standards

Reference standards are used for calibration and calibration verification in all analyses requiring comparison to a chemical substance. The reference standards used are those specified in the reagent sections of the respective standard operating procedures. Wherever available, reference standards are traceable to national standards of measurement. If NIST (National Institute of Standards and Technology) traceable standards are not available, reference standards of the best purity and quality

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from a reputable supplier are procured by the supervisors of each department by careful study and consideration of the chemically pure substances available. It is the responsibility of the supervisor of each area to requisition reference standards of required quality appropriate for the analysis being performed and to provide correlation of results per NELAC standards. All purchased reference standards are delivered to the Sample Receipt Area to be unpacked, verified for accuracy against the invoice. The standards are then delivered to the individual departments along with their respective Certificates of Analysis provided by the supplier, where the supervisor verifies that the correct standards have been received. Certificates of Analysis are kept on file for all reference standards within the respective departments. Records are maintained for each stock reference standard used in the laboratory including the identity, a unique reference ID number, dates received, lot number, and supplier. Each reference standard will itself be labeled with the reference ID number, the date received, the date opened, and the initials of the analyst opening the standard, or will be labeled with the reference ID number allowing the traceability to these items.

Working standards are prepared using quality reagents as outlined in 8.1, reference standards, Class A volumetric glassware, and properly calibrated laboratory equipment such as balances and pipettors. Bound logbooks are maintained indicating the reference ID number of the working standard, the concentration, the reference ID number(s) of the stock standard(s) used, the dilution performed, the matrix, the preparation and expiration date, and initials of the analyst preparing the standard. All prepared standards will be properly labeled with the reference ID number, the date of preparation, the preparer's initials and the expiration date of the standard, or will be labeled with the reference ID number allowing the traceability to these items. Any health and safety concerns shall also be noted on the label. This documentation allows standard traceability back to the original Certificate of Analysis.

Reference standards from an independent source are used in all methods for calibration verification. They are purchased and prepared separately from a source independent of the calibration standards. If not available from a reliable second source, they are prepared separately from a different lot than that of the calibration standards. These are used to verify and control the accuracy of the working calibration standards before Customer samples are analyzed. Acceptance criteria are set per method requirements for the calibration verification standards, and are listed in each respective standard operating procedure. Calibration verification standards falling outside of the acceptance criteria result in the analysis being discontinued until the cause can be investigated and corrected.

Reference standards used to spike samples before a preparative process, such as surrogate and matrix spike solutions used during extractions, are subjected to a critical solution quality verification procedure prior to use. This ensures that the standards are of acceptable quality before extraction is performed. This procedure consists of preparing organic surrogate and spiking solutions pursuant to the method required, and aliquoting a portion of each lot into a separate analysis vial. The formulated standard is then placed in a holding area to await approval, and the aliquot is delivered to the appropriate analytical department for testing. Once the analytical department grants approval, as indicated by a completed Quality Verification Data Form (see Figure 2), the solutions may be removed from the holding area and placed into use for extraction of samples. If approval is denied due to insufficient quality, all portions of the lot of surrogate or spiking solution are discarded. Verification that the standard is the correct concentration and of the correct purity before use in extracting samples is the responsibility of the supervisor of the department in which the analytical testing is being performed.

8.3. Removal of Expired Chemicals and Standards

Each laboratory group manages its own inventory for expiration date. Any chemical, reagent, solution or standard, which is past its expiration date, and cannot be verified for reliability, is removed from service and placed in the laboratory's internal waste management system. Expired standards or chemicals will not be used for analyzing samples unless the laboratory verifies its reliability. Verification records shall be

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kept with the Supplier's Certificate of analysis and retained for review by local, state and federal agencies. Any expired standard, which is retained for training purposes, or as a reference material must be clearly marked, "Not for Instrument Calibration – Expired Standard" or "Not for Analytical Use – Expired Standard."

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8.4. Purchased Materials

ALSI routinely purchases consumable items for the laboratory through the laboratory-purchasing agent. The department supervisors are responsible for selecting all items for laboratory use as specified in the individual method SOPs. All items shall be of the required quality as dictated in these SOPs. The Operations Manager reviews all *purchase requisitions* before the orders are placed. The supervisors will submit all pertinent information on a purchase order to the purchasing assistant. The purchasing assistant is responsible for placing the order with the approved vendor and assuring that items are received intact in the time period requested by the department supervisor. It is possible for a department supervisor to place an order directly with the appropriate vendor in cases where an item is needed in short periods of time and the purchasing assistant and Operations Manager are not available to approve and place the order. Records are documented for all items ordered by the laboratory. Those from the current year are filed in the administrative office, while those from previous years are filed in locked storage for a minimum of ten (10) years.

All purchased items are delivered to a Sample Receipt Area to be unpacked, verified for accuracy against the invoice, and inspected for breakage. Any unacceptable item is returned to the purchasing assistant to be sent back to the vendor in return for the correct, intact item. Items that are common to all the departments and those received in large quantities, such as sample collection bottles (8.4.2), are stored in the locked storage room until use. The Sample Receipt Custodian may initial the invoice for these items. Other items are delivered directly to the department that submitted the order for initialing of the invoice and storage. It is the responsibility of the department supervisor to insure that the items received are of the required quality. Any certificates received for goods and services that have a direct influence on quality are saved and filed for reference.

The same consumable items used in the routine analysis of samples, such as test tubes, Pasteur pipettes, etc., are also used in the preparation and analysis of calibration standards and control checks. If the quality of results for the calibration standards and control checks is within the acceptance criteria outlined in the method, then the consumable items are considered to be of acceptable quality to perform the analysis.

8.4.1. Volumetric Dispensing Devices and Glassware

Mechanical dispensing devices such as (but not limited to) Eppendorf pipettes shall be checked for accuracy on at least a quarterly basis. Verification of accuracy is not required for Class A glassware unless required by specific project plans. Icroliter syringes will be treated as Class A glassware if a certificate verifying the accuracy is provided by the manufacturer, otherwise a one time initial verification of accuracy must be performed and documented.

8.4.2. Sample Collection Bottles

ALSI provides appropriate containers for sample collection. See Appendix B for a listing of the appropriate sample containers available for each method. All bottles are disposed of after a single sampling.

ALSI purchases pre-cleaned bottles for various analyses. These are cleaned in accordance with EPA specifications. Careful inspection and comparison of the bottles received against the invoice is performed to assure that the quality of the bottles is that which was ordered. Bottles used for microbiological

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samples are subject to a documented sterility check for every batch of the same lot number. This check must meet acceptance criteria described in the same document before the bottles can be used for sample collection. All bottles are used only once, and are disposed of.

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Bottles used in the analysis of samples are also used in the periodic analysis of field and trip blanks. The department supervisors monitor results of field and trip blanks at the time of department approval. If a field or trip blank is found to have positive results, and contamination from the bottle is suspected to be the cause, the corrective action process described in Section 18.0 of this manual is followed.

8.5. Vendor Approval

8.5.1 New Vendor

Once interest in using a new vendor is determined by management or supervisory personnel, the Purchasing Department will initiate the *New Vendor Evaluation* procedure. Prior to any Purchase Order being placed, the Chief Financial Officer will assign a Purchasing Assistant the task of starting the evaluation process. The Assistant is instructed to use the *New Vendor Evaluation Form* to gather as much information as possible on the potential vendor as the form dictates. This may involve extracting the Dun and Bradstreet rating of the vendor, requesting vendor references, questioning management regarding the vendor's known reputation in the industry, etc. This form is then turned into the Chief Financial Officer for review and final approval. If the vendor meets ALSI's requirements, the new vendor will be listed on the ALSI Approved Vendor List. All New Vendor records will be maintained in the Purchasing Department for review.

8.5.2 Existing Vendor Evaluation

Each significant vendor affecting quality analysis in ALSI shall be evaluated periodically. The Purchasing Department shall perform this evaluation function with the assistance and participation of affected laboratory personnel. The Purchasing Department shall perform no less than five (5) evaluations per calendar year. Evidence of these evaluations will be documented on the Existing *Vendor Evaluation Form,* which will become a permanent record for that vendor. These records will be maintained in the Purchasing Department for review.

8.5.3 Vendor Performance Monitoring

A *Vendor Incident Record* will be maintained showing any problems that arise throughout the year with any existing approved vendor. Any ALSI employee can complete this record in an attempt to capture any and all related quality issues regarding products and services received. These records shall be kept active until resolved in which case the record shall be maintained in the vendor's permanent file for reference. These records will also be critical in the periodic review of an existing approved vendor.

8.6. Balances

ALSI maintains multiple balances for analytical measurements throughout the laboratory. Calibration checks are performed and documented on each day of use for each balance. This calibration check consists of a measurement of two or more NBS Class 1 weight reference standards that bracket the anticipated range of use, are used exclusively for calibration and compare to acceptance criteria listed in the associated balance calibration standard operating procedure.

Each balance is serviced and calibrated over the range of use annually by a manufacturer's certified representative. Balance Calibration Reports and Certificates of Weight Traceability are kept on file identifying traceability of test weights used to the National Institute of Standards and Technology. NBS

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Class 1 weights are returned to a certified calibration laboratory at least every five years for re-certification.

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9. Scope of Tests

Unless superseded by Customer or project requirements, analysis of samples is performed using EPA or EPA-approved methods. For those analyses that do not have EPA-approved methods, the analytical methods used are taken from standard sources, where such methods exist (ASTM, API, etc.). The standard analytical methodologies performed by ALSI can be found in Appendix B along with the recommended container, preservation, storage and holding times for each methodology.

ALSI will not accept samples that require test methods that have not been published in national standards, such as those listed in Section 14.0 of this document, unless these methods have been agreed upon by the Customer and have been documented and validated by the laboratory. It is the responsibilities of the laboratory management to determine which validation studies are appropriate for a given analysis on a case-by-case basis. The effectiveness of a non-standard analytical method is then evaluated and approved by laboratory management as determined by the results of the validation studies performed. Examples of validation studies demonstrating effectiveness are reference standard analysis, blank studies, MDL studies, precision and accuracy studies, determination of calibration range, or proficiency sample evaluation. These studies will be made available to the Customer and any recipients of the reports upon request. Non-standard methods are clearly indicated on Laboratory Analysis Reports as modified or in-house methods.

10. Review of Solicitation, Offer or Contract

Upon receipt of a formal solicitation, offer or contract—also referred to as a Request for Proposal (RFP), Request for Quotation (RFQ), or similar document—containing items such as contractual language, specific QAPP information, target compound lists, delivery schedules, the document (when bid is issued) is assigned to one of the proposal staff. The proposal staff—the President, Technical Director, Operations Manager, National Accounts Manager, Account Executive, and/or Project Coordinators—are all capable of completing a solicitation, offer or contract. The proposal staff will review pertinent pieces for content and requirements. The President, Technical Director and/or Operations Manager will be involved with the technical review for method specific or Customer specific analytical requirements to complete the designated turnaround schedules and work plan as requested within the solicitation, offer or contract. As part of the review process the QC Manager will include the current accreditation status of the laboratory per the project requirements. If accreditation does not exist, or cannot be completed prior to the project start date the request for solicitation, offer or contract may be refused by ALSI. Additionally, if during the course of the contract the laboratory is subjected to suspension of accreditation, revocation of accreditation, or voluntary withdrawal of accreditation this information will be immediately communicated to the Customer.

The Sales Administrative Assistant is responsible for supporting the proposal staff in generating the specific qualifications information and/or promotional information required within the solicitation, offer or contract.

The proposal staff reviews the terms & conditions of sale, and the overall requirements of the scope of work for continuity, enforceable penalties, liabilities, and expectations, as indicated in the solicitation, offer or contract.

The Sales Administrative Assistant completes the final solicitation, offer or contract following the collection of the above information and resolution of outstanding questions or issues generated by each

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group. The proposal staff will follow up with the Customer after the solicitation, offer or contract is delivered.

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10.1. Laboratory Capacity Review

For any solicitations, offers, or contracts generated over $10,000, a review of the equipment and personnel will be performed by the President, Technical Director, National Accounts Manager, and/or Operations Manager. A Proposal Request Form will be attached to the front of the proposal with a checklist (see Figure 3). The Proposal Request Form is used to define the project specifications requested by the Customer. If the laboratory does not have the capabilities to perform the new work, this will be noted on the cover sheet. Actions taken to provide the necessary resources will be documented on the cover sheet or it will be noted that the proposal was not accepted.

10.2. Amendment to Contract

When an amendment is requested to a contract that has been already signed and accepted by both parties and the project has not been initiated, the laboratory will reserve the right to propose adjusted rates and delivery schedules that reflect the "new scope of work." If the changes in the work do not impact the objectives of the work plan nor necessitate a change in delivery schedule or unit pricing, then the amendment will be adopted and all parties involved will proceed under the amended contract.

An amendment to a contract that necessitates changes in the product to be delivered, turnaround times, sample delivery groups, required labor and equipment to meet objectives may require a negotiation in the unit pricing for the new analytical services package. No work outside the original scope of work will be performed until all outstanding issues and/or discrepancies are cleared between the Customer and the laboratory.

Amendments during an ongoing project that necessitate pricing adjustments, delivery schedule changes, or other changes to the normal laboratory routine, will be mutually addressed in a timely manner by the Customer and the laboratory. The laboratory will make all attempts to meet holding times on samples received under the initial contract in "good faith" that all parties will meet with a mutual understanding of the new delivery schedule and associated fees for the change orders.

All affected laboratory departments are participants in the commitments made to an amended scope of work under an amended contract.

11. Demonstrating Method Performance

When new methods are implemented or a Customer requires a method not routinely performed, there are certain requirements that must be fulfilled prior to performing work to demonstrate adequate method performance.

Methods published in national standards that have not previously been performed at ALSI require a demonstration of method performance that meets or exceeds minimum expectations as published in the method. These may include, but are not limited to, initial demonstration studies required by the method, blank studies, method detection limit studies, precision and accuracy studies, QC check sample performance, and calibration ranges. A standard operating procedure must also be written for the analysis. Once these validation studies have been completed and satisfactory performance has been demonstrated, samples may be analyzed by the new method.

Methods not published in national standards, such as special project procedures or screening methods are also subject to a demonstration of method performance before use in analyzing project samples. It is the responsibility of the Technical Director or QC Manager to determine which studies are appropriate for

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a given analysis on a case-by-case basis. Once satisfactory performance has been demonstrated as determined by laboratory management, samples may be analyzed by the new method.

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12. Customer Services

Customer Services is one of the most important and integral parts of the ALSI operation. ALSI's Customer Services Department consists of Project Managers who are responsible for the Customer's project from set-up through completion. These responsibilities include routine requests for coordinating technical support from new or established Customers, project set-up and document review, project status requests, maintenance of pertinent discussions with Customers relating to sample analysis requirements, and project follow-up upon completion of the analytical tasks.

The Project Managers along with the support of the individual laboratory departments, have the greatest impact on the success of a Customer's environmental monitoring program or project. The Project Managers are the laboratory's interface with the Customer and a major key to continuing a future relationship with them. In conjunction with the success of a program or project, our Customers rely on the responsive and efficient manner in which their questions or concerns are managed.

The ALSI Customer Services Department is under the direction of the President. However, the Customer Services Manager supervises the direct day-to-day operations of all Project Managers. All of these functions relate directly to the initial set-up of an environmental monitoring program or project, initiation of ALSI's services, and project follow-up support.

12.1. Project Planning

ALSI has been in existence since 1979. Standard Operating Procedures (SOPs) and required instrumentation have been continually purchased and brought online in response to markets created throughout this time-period. Tests and associated instrumentation are for commercial application, and therefore, most of the work that is brought to the facility is to be completed following standardized EPA procedures that have been incorporated into the ALSI's SOPs.

The President, National Accounts Manager, Technical Director, and Operations Manager are responsible for the type and quantity of work that is accepted and moreover promoted by ALSI. Solicitations, offers, contracts and/or specific Customer requests that are extraordinary are reviewed by the President, Technical Director and/or Operations Manager as to the viability of the program and the ability of the laboratory and associated personnel to successfully complete the objective of the scope of work. Subcontracting, MDL studies for non-standardized compounds, and scheduling adjustments may all come about as a result of each project's inherent requirements. The objective of having prior notification of sample receipt or prior notification of a Customer's expectations is to have as much time as possible to react and to meet or be able to address the Customer's project requirements.

Daily work schedules are generated, validated and utilized by the Department Supervisors as they oversee production within their departments. The key components of these schedules are holding times, delivery times and the specific or extraordinary requirements of a sample delivery group. The Operations Manager oversees the Department Supervisors who are held accountable for the management of their respective departments.

Customer Services assists the Sample Receiving Department in the review and formalization of the tests that will be performed, associated bottleware for the field, labeling, test methodology to be requested, adequate and proper preservation reagents as well as communication to the field. They also

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communicate within the laboratory regarding sample deliveries and holding times associated with the sample delivery groups.

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As the Customer's samples are logged-in and processed, any discrepancies or issues will then be addressed as soon as possible to their Customer Service representative.

12.2. Organizational and Technical Interface

Customer Services is the main contact for a project once the first sample delivery group has been received and logged-in by the laboratory. Project tracking includes not only the Customer Services Department but also involves the cooperation of the Operations Manager and the Technical Director who together will track the project movement throughout the laboratory, resolve any issues that arise during the sample preparation, analytical steps and final reporting of the data. Project Managers are assigned upon contract award.

Large projects with multiple sample delivery groups usually require constant interaction with the field to communicate coordination of supplies and sample movement into the facility. This allows the Project Manager to establish the ongoing dialogue needed and the openness of communication that develops between the Customer and the laboratory. Delays in sample processing due to instrumentation failure, matrix effects, etc., are brought to the Customer's attention as soon as practically possible once the Department Supervisor has notified Customer Services. It is imperative that the Project Manager be notified in a timely manner by the laboratory personnel to minimize any additional costs and operational impacts in the field.

Scope of Work changes, delays in the field due to equipment failures or weather are all communicated through the Project Manager into the laboratory departments that are affected by the change. Work schedules can then be adjusted and resources can be redirected within the operation for maximization of equipment utilization for the Customer and their samples.

Delays in fieldwork may require a re-commitment by the laboratory towards the due dates and deadlines that were initially set. The Operations Manager and Department Supervisors will then mutually agree upon a new commitment to the Customer so that all involved can plan proactively for future commitment of all resources.

13. Control of Nonconformance Testing

Ideally, all data inquiries should occur prior to the release of the analytical results to a Customer. However, if a Customer should question an analytical result, the analysis must be reviewed thoroughly in order to alleviate the Customer's concerns as well as to ensure that the laboratory is not suffering from a procedural problem.

If Customer Services determines that further corrective action is necessary due to a data inquiry received by a Customer it shall be documented on an ALSI Corrective Action Report (CAR) (see Figure 5). This form will contain the general information of the data in question. Following initiation, the appropriate department supervisor will review this inquiry. The supervisor will review all associated raw data regarding the inquiry. Root cause analysis/resolution will be recorded on the CAR. The CAR will then be returned to the Project Manager with a copy to the QA Department. The Project Manager will inform the Customer of all pertinent information regarding the data inquiry. If reanalysis is required, the Customer will be given the approximate date that they can expect reanalysis results.

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The QA Department will review the copy of the inquiry and perform follow-up regarding quality issues, if required. The CARs are summarized monthly and charted by "cause". These charts are reviewed annually by ALSI management and may effect changes to the laboratory's quality assurance practices.

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From the information available a CAR may precipitate a correction of the final results, reanalysis of the Customer sample and/or additional action by the Quality Control Department. Additional action may include performing an internal audit to determine if the problem occurred due to a non-authorized procedural change requiring method revision and/or additional analyst training.

Additional information regarding control of nonconformance testing can be found in the Standard Operating Procedure 99-Corr A.

14. Test Method Reference

14.1. Analytical Procedure References

ALSI relies primarily upon the most current EPA approved revisions of the references listed below for methodologies used in the laboratory. Procedures contained in these references are acceptable for use only after the lab has demonstrated and documented adequate performance with the method such as method detection limit studies, precision and accuracy studies, proficiency sample analysis, and linear calibration range studies. These studies are then routinely verified as long as the methods are in use in the laboratory.

- "Methods for Chemical Analysis of Water and Wastes," U.S. Environmental Protection Agency, 1979. Revised 1983.
- "Standard Methods for the Examination of Water and Wastewater," American Public Health Association, 18th Edition, 19th Edition, 20th Edition.
- "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," EPA SW-846, Third Edition, 1986, Revision 1, July 1992, Update II, September 1994 and Update III, June, 1997.
- 40 CFR Part 136, Guidelines Establishing Test Procedures for the Analysis of Pollutants.
- 40 CFR Part 141, National Primary Drinking Water Regulations.
- "Methods for the Determination of Organic Compounds in Drinking Water", EPA 600/4-88/039, Rev. July 1991; Supplement I, EPA 600/4-90/020, July 1990; Supplement II, EPA 600/R-92/129, August 1992; Supplement III, EPA-600/R-95/131, August 1995.
- "Methods for the Determination of Inorganic Substances in Environmental Samples", EPA 600/R-93/100, August 1993.
- "Methods for the Determination of Metals in Environmental Samples", Supplement, EPA 600/4-88/039, Rev. July 1991; Supplement I, EPA 600/4-90/020, July 1990; Supplement II, EPA 600/R-92/129, August 1992.
- "NIOSH Manual of Analytical Methods"
- Annual Book of ASTM Standards.
- National Environmental Laboratory Accreditation 2003 Standard, Approved June 5, 2003.

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- International ANS/ISO/IEC 17025 Standard, Second Edition, 2005-05-15.

14.2. Standard Operating Procedures

A set of departmentally appropriate Standard Operating Procedures (SOPs) is available in each of the laboratory areas. The SOPs are comprised of clear, complete written instructions for completing each standard test performed by ALSI. Standard Operating Procedures include the following sections if applicable to the laboratory's direct performance of the method. Otherwise, analysts shall consult the reference method indicated in the Scope and Application Section of each SOP for the sections not included in a particular SOP. Other pertinent sections in addition to the following may be included as necessary.

- **Scope and Application** which includes:
  - Identification of the Test Method
  - Applicable Matrix or Matrices
  - Detection Limit
- **Method Summary**
- **Definitions**
- **Interferences**
- **Safety**
- **Apparatus and Materials**
- **Reagents**
  - Includes any chemicals used in the procedure, including reference standards
- **Calibration**
- **Quality Control** which includes:
  - Data Assessment and Acceptance Criteria for Quality Control Measures
  - Corrective Actions for Out-of-Control or Unacceptable Data
- **Sample Collection, Preservation, and Storage**
- **Procedure**
- **Calculations**
- **Reporting Results**
- **Method Performance**
- **Pollution Prevention**
- **Waste Management**
- **Troubleshooting**
- **References**
- **Tables, Diagrams, Flowcharts, and Validation Data**
- **SOP Change History Summary**
- **SOP Concurrence Form**

All analysts performing a particular method are expected to sign the SOP Concurrence Form, which is kept on file as part of the analyst training record, to indicate that they have read, understood, and agreed to follow this revision of the SOP. Laboratory supervisors are responsible for technically validating, maintaining and updating SOPs on an annual basis, which are then administratively validated and or reviewed by the Quality Assurance Department before being initiated for use in the laboratory. A guideline for writing, issuing, and revising SOPs can be found in ALSI SOP 99-SOPs. All revisions of Standard Operating Procedures are archived in the Quality Assurance Department where they are retained for a minimum of ten (10) years.

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14.3. Laboratory Analyses

14.3.1. Test Scheduling

Test scheduling is accomplished through the Laboratory Information Management System (LIMS) and is coordinated by the laboratory supervisors. Each of the laboratory departments prints a "Backlog Report" at the beginning of each day or during the day as needed. This report lists the outstanding analyses from each of the departments. Each department supervisor is responsible for monitoring Backlog Reports pertinent to their section, which is used in the scheduling and recording of laboratory analyses. The Backlog Reports are identified as follows:

- VOGC - Gas Chromatography - Volatiles
- VOMS – Gas Chromatography/Mass Spectroscopy - Volatiles
- SVGC - Gas Chromatography - Semivolatiles
- HPLC - High Performance Liquid Chromatography
- SVMS – Gas Chromatography/Mass Spectroscopy – Semivolatiles
- META – Metals
- WETC – Wet Chemistry
- MICR – Microbiology
- SUB - Subcontracted Analyses
- PREP – Prep Department
- FLD - Field Analyses

Using the LIMS reports, the supervisors assign tests to the laboratory analysts. The analysts enter the computer system to schedule the analyses. This is done in the "Batching" area of the LIMS. The information entered by the analyst is recorded in the system for use by other laboratory personnel. Anyone using the computer system to inquire on the scheduled samples will see this information.

14.3.2. Record of Analyses

Laboratory records are traceable, retrievable and legible and include sufficient information and explanation such that any staff that did not perform the generation can readily interpret them. This also allows repetition of the analysis at a later date, if necessary.

While performing a test, all the necessary information is recorded in different manners, depending on the type of test. A test that does not use automated equipment has all necessary information recorded in bound laboratory notebooks. The logbooks are test-specific and contain the date of analysis, the initials of the analyst, the laboratory sample numbers, the result obtained, the units of the results, any calculations involved, instrument ID, and any comments concerning unusual circumstances encountered. All entries into the logbooks are original and are recorded in indelible ink.

Other tests require the use of automated instruments and computers. The computer printouts generally contain the laboratory sample number or a reference ID which can be traced to the sample number using an analytical run logbook, instrument ID, analyst's initials, date of analysis, and time of analysis in the header information. The header should also contain a reference to the method being used. Included with each package of data there is a listing of samples analyzed in the sequence and a listing of the instrument parameters under which the samples were analyzed. If any deviations from the set instrument parameters are required for an individual sample, these changes are noted on that sample's printout. If an instrument is set to run over more than one shift and another analyst will be taking over the responsibility of the analysis of samples run on his/her shift, a comment is written on the printout of the first sample where responsibility was transferred.

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If any corrections or amendments to the records need to be made, the incorrect data will have a single line drawn through it and the correct data entered. If the correction is due to other than a transcription error the reason must be clearly stated. The change is initialed and dated by the person responsible for making the change.

14.3.3. Preps Performed Entry

Preparatory processes, such as sample digestions or extractions, frequently involve dilutions or concentrations of samples before analysis begins. These dilutions or extractions result in factors that must be taken into consideration when calculating final concentrations. In order to account for these "prep factors", the initials and final volumes/weights are entered into the LIMS after the samples are prepared and readied for analysis. This is accomplished by a preparatory analyst in the LIMS "Posting" area to create a batch of sample prep factors. Each batch is test specific and contains the date of preparation, the analyst performing the prep, the associated batch QC sample identifications, and the initial and final volumes/weights of each of the samples in the batch. These initial and final measurements are then easily retrievable and automatically used in the calculation of final sample concentrations, which are reported to the Customer. This system eliminates the possibility of human error resulting from manual calculations.

14.3.4. Reporting Results

Once an analysis has been completed and results checked for validity, the data is available to enter into the LIMS. All sample results and their associated quality control data are entered into the LIMS under the individual laboratory departments for the analyses performed in those departments. This is accomplished by each analyst in the LIMS "Posting" Entry/Edit area. Each batch is test specific and contains date and time of analysis, analyst completing the analysis, the instrument used for analysis, and sample results generated for one or more Customer samples as well as the associated quality control data produced during the analysis of those samples. In addition, any comments concerning the samples themselves or the analysis of the samples, such as non-conformances or interferences with the method are entered at this time. All results are reported to three significant figures but limited to the number of decimal places in the reporting limit for the individual compound or analyte.

15. Sample Handling

15.1. Sample Collection

15.1.1. Sampling Procedures

In order to produce meaningful analytical data, ALSI must have samples that are representative of the system from which they were taken. If the representation and integrity of the samples received in the laboratory cannot be verified due to inadequate sampling procedures, the usefulness of the analytical data produced for these samples is limited. The laboratory cannot accept responsibility for improper sampling of Customer-procured samples and will document the condition of the samples and analyze them as delivered. If an incorrect sampling procedure is suspected, the Customer will be notified as soon as possible by the Project Manager. ALSI will postpone testing, if the holding time will not be exceeded, pending Customer response. Sampling instructions and acceptance criteria are available to Customers upon request.

Sample collection services are provided by ALSI through personnel from the field services department. Documented procedures for field sampling are outlined in the *Field Services Sampling Plan*. Sampling personnel ensure that collected samples are representative of the original systems, fully labeled and identified, and properly preserved and transported to the laboratory.

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Where sampling, as in obtaining sample aliquots from a submitted sample, is carried out as part of the test method, the laboratory uses documented procedures as outlined in SOP 19-Subsampling to obtain a representative sub sample.

15.1.2. Bottle Orders/Bottle Preservation

Bottle orders requested by customers are filled via a program that allows ALSI to enter, store and track bottle orders and are completed by ALSI Sample Receiving. Preparatory personnel enter any tracking numbers and cooler numbers associated with the order. Bottle order sheets and labels are printed automatically and a copy of the order is sent along to the customer describing exactly what has been sent. The program has the ability to assign site IDs to the bottles, permit documentation of special instructions, time date and time stamp the order, and dependent upon how the order is being delivered, can notify Field Services personnel automatically via e-mail to deliver the bottles to the appropriate customer.

Bottle preservation is performed by ALSI according to the information in Appendix B, which lists appropriate preservatives and holding times for commonly performed analyses. The grade of acids and bases that are used for preservation are all designated for specialized instrumental methods, including trace organic or trace element analysis. The lot numbers of the acids and bases used for preservation are recorded in a logbook kept in the sample receipt room.

Because ALSI does not know the exact nature of the matrix to be preserved, a uniform amount of acid or base is added to the bottles prior to shipment. The amount added equates to 4.0 mL of concentrated acid per liter of sample or approximately 4.0 mL of 10 Normal sodium hydroxide solution per liter of sample. For samples collected in amounts less than one liter, the preservative amounts will be decreased proportionally. It is the responsibility of the Field Service Coordinator to manage the generation of bottle orders through the Sample Receiving Department. Additional information on bottle preparation can be found in the Standard Operating Procedure entitled 19-Bottle.

Upon return of the samples to the laboratory, the pH is measured on all samples (excluding volatiles) where pH adjustment is needed for proper preservation. If the pH of any container is outside the specified limits for a given test, additional acid/base is added to bring the pH into the proper range. An adjustment of this nature is recorded in the Electronic Preservation Logbook (See Figure 4), which is maintained in the sample receipt area, along with the lot number of the preservative used. It is also documented on the Corrective Action Form (See Figure 5), which is maintained with the chain of custody. It is the responsibility of the Sample Custodian to maintain the Electronic Preservation Logbook. Any adjustment is also noted as a comment on the final laboratory report. This testing and adjustment procedure is also followed for other preservation requirements such as the addition of sodium thiosulfate to eliminate residual chlorine content and temperature of samples.

For volatile organic samples, the pH and chlorine content is checked using one of two different procedures depending upon the type of autosampler used. For the Archon style autosamplers, the pH and chlorine content of the sample is not checked until the analysis of the sample is completed. This is because the analysis of a VOA sample is done in a completely closed system and the sample is never opened in the laboratory. The Archon autosampler removes an aliquot for testing by piercing the septa and withdrawing the sample at the time the sample is analyzed. At the completion of the analysis sequence, the sample remains are tested for pH and chlorine content using conventional methods. For the older style autosamplers (Tekmar 2016, etc.), the sample bottle is opened and a portion of sample is

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transferred to a purging chamber for analysis. The sample pH and chlorine content is checked using the remaining sample in the bottle after the sample has been loaded on the instrument.

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The pH and chlorine content will be recorded on the associated laboratory logbook in both the GC or GC/MS departments. If a sample pH or chlorine content is not within the proper range the sample will be analyzed, a comment (qualifier) will be placed on the final laboratory report, and a corrective action form will be initiated. The appropriate Project Manager will be notified by the department, who will then take the proper steps to notify the Customer. The Customer can then make the decision as to whether or not to resample.

The sample custodian, as defined in section 15.2.2, will check the volatile analysis bottles upon receipt to ensure no headspace is present. If sample containers have been found to contain headspace, the sample custodian will note this on the Chain of Custody. The sample custodian will notify the appropriate Project Manager who will then take the proper steps to notify the Customer. The Customer will be informed that the volatile sample does not conform to proper sampling procedures. It will then be the Customer's decision as to whether the sample is analyzed or resampled. If the sample is analyzed, a comment will be placed on the lab report stating that the sample contained headspace.

For tests that require filtration prior to preservation, this filtration is performed in the field prior to the sample entering the bottles containing preservative. If the laboratory must filter any sample prior to analysis it should not be preserved. The type of filter used and the date and time of filtration will appear as a comment on the laboratory report.

15.1.3. Holding Time

Holding time is the time from sampling until the start of analysis. The date and time of sampling documented on the chain of custody establishes the time zero. If the holding time is specified to be measured in hours, then each hour is measured from the minute the sample was collected in 60-minute intervals. When the maximum allowable holding time is expressed in days, the holding time is based on calendar day measured from time zero, the date the sample was collected. The first day of holding time is not passed until midnight of the day after the sample was collected. Holding times for analysis include any necessary re-analysis due to instrument failure or analyst error that does not yield useful data. If a re-analysis is necessary due to the nature of the matrix of the sample, such as a dilution or matrix spike failure due to matrix interference, the holding time has been met if the initial analysis was run within time. A comment is added to the final report stating that further analysis was required past hold time. The sampling time must be documented on the chain of custody form by the Customer. See Appendix B for a listing of analytical methods and their holding times.

15.1.4. Turnaround Time

Turnaround time is the time from receipt of samples to the transmittal of analytical data by mail, electronically or facsimile. The signing of the chain of custody form by the sample custodian sets the zero time for the reporting turnaround time. The required turnaround time will be based on a twenty four hour day multiplied by the number of days, from the time of signing of the chain of custody form, not including weekends and holidays, unless specified in the job specific quotation. The turnaround time for samples received weekdays after 3:00 PM will be the following business day.

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15.2. Sample Custody

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15.2.1. Chain of Custody Form

Chain of Custody documentation tracks the historical possession of samples. A completed Chain of Custody must accompany all samples entering the laboratory (Appendix C). This form provides essential information to the laboratory regarding sample collection and analyses required, and includes the Customer name, project name, sampler's name or initials, sample location, sampling date and time, number of containers, type of preservative used, sample type, special remarks concerning the sample or project, and analytical parameters requested.

Sample preparation logs and sample analysis logs document the custody and transfer of sample extracts/digestates from preparation to analysis. The LIMS also tracks these processes and documents them on the final laboratory analysis report. A more detailed internal chain of custody is available for use upon Customer request for special projects or for samples being tested for litigation purposes (See Figure 6). Standard Operating Procedure 99-LCOC provides detailed instructions describing legal chain of custody procedures. Electronic Internal Chain–of-Custody is currently being tested for laboratory wide usage and is implemented using barcode labels. Standard Operating Procedure 19-Rec/Han provides instruction on reviewing and inspecting the chain of custody for discrepancies. This is accomplished by inspection and comparison of the samples received against the chain of custody to identify any discrepancies. Sample receiving will immediately notify the customer service department of samples received without a chain of custody via US Mail, Federal Express, UPS, etc. These samples will be placed on hold until the chain of custody is received from the Customer. For walk-in customers dropping off samples, a copy of the COC will be given to them to fill out before sample acceptance. Complete chain of custody documentation, including memos, transmittal forms, etc., are filed and properly retained by the laboratory.

15.2.2. Sample Receipt

Upon arrival in the laboratory, samples are received by a sample custodian who ensures that a proper Chain of Custody accompanies all samples. The Chain of Custody will be signed by the person delivering the samples to relinquish the samples to the sample custodian. The sample custodian will then inspect and compare the samples to be received against the Chain of Custody to identify any discrepancies before signing the form and receiving the samples into the custody of the laboratory. The date and time relinquished/received is also recorded on the Chain of Custody. A Cooler Receipt Checklist is also filled out on the Chain of Custody for each container received by a third party transporter (i.e. FedEx). Information relating to shipping, sample temperature, custody seals, Chain of Custody/label agreement, container condition, sample amount, and container size/type/preservation is recorded.

If discrepancies cannot be resolved at the time of sample receipt by Sample Receiving personnel Project Management will address them during the chain-of-custody review following LIMS entry.

15.2.3. Acceptance/Rejection Criteria

When a sample arrives in the laboratory, a decision is made to accept or reject the sample. It is the responsibility of the Sample Receiving Department to verify and document any nonconformance regarding use of appropriate sample containers, preservatives, packaging, and incorrect documentation and labeling upon receipt of samples. The condition of the sample, such as sample cooler temperature, pH, chlorine content, etc., is recorded on the Chain of Custody and in the Sample Preservation Logbook (See Figure 4). Any conditions outside of acceptance criteria are noted as comments on the final laboratory report. In cases where samples are hand delivered to the laboratory immediately after collection, they are immediately refrigerated.

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ALSI reserves the right to reject a sample upon receipt in the laboratory if any of the following conditions occur:

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- The sample is not properly documented on the chain of custody form and on the sample label with water resistant labels and indelible ink. Documentation shall include sample identification, the location, date and time of collection, collector's name, preservation type, sample type, and any special remarks concerning the sample.
- The sample has exceeded the holding time for the requested analysis.
- The incorrect preservative was used during sample collection.
- Incorrect sampling protocols were used during sampling (i.e., a sample not being filtered in the field for dissolved metals).
- Improper sample container was used.
- Insufficient sample is present to perform the requested analysis.
- Improper storage or transport of sample has occurred prior to receipt.
- Excessive amount of sample has been collected or other conditions exist which would make disposal difficult.
- Samples show signs of damage or contamination.
- Sample contains hazardous raw material that is not accompanied by an MSDS or material that cannot be safely handled by the laboratory (i.e.: radioactive material).

When there exists any doubt as to a samples' suitability for testing, where the sample does not conform to the description provided, when the samples show signs of damage or contamination, or where the test required is not fully specified, the appropriate customer service representative or project manager is notified. They, in turn, are responsible for notifying the Customer for further instruction before proceeding. Any instruction given by the Customer is recorded on the original chain of custody and may be noted on the Final Lab Analysis Report. If the sample does not meet the above acceptance criteria, the appropriate customer service representative or project manager shall retain correspondence and/or records of conversations concerning the final disposition of rejected samples or fully document any decision to proceed with the analysis of samples not meeting acceptance criteria. The condition of these samples shall, at a minimum, be noted on the chain of custody document. The analysis data shall be appropriately qualified on the final report.

15.2.4. Sample Identification and Control

To ensure sample accountability, all samples receive a unique sample identification number upon receipt into the laboratory. This identification number, which is used to identify and track the sample throughout the laboratory, is recorded on the chain of custody and on the durable water-resistant labels placed on all of the sample bottles. This number along with information from the chain of custody form is entered into the Laboratory Information Management System (LIMS). The LIMS contains all the information necessary to locate and track the sample. It also contains the information regarding specific analyses and turnaround commitments.

15.2.5. Sample Storage

Since samples have different storage requirements, samples are maintained in various locations throughout the laboratory. Samples are stored away from all standards, reagents, and other potentially contaminating sources in such a manner as to prevent cross-contamination. All samples received are refrigerated above the freezing point of water up to 6°C to comply with state certification requirements. Samples receiving volatile analyses are segregated from other samples in order to prevent cross-contamination. High concentration material or neat chemicals shall be stored separately. Samples not requiring refrigeration, such as aqueous metals samples, are stored at room temperature. After results are reported to the Customer, samples are held for an approximate two-week period. At the end of the two-week holding period, samples will either be discarded by the laboratory or returned to the Customer.

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ALSI will not be responsible for disposal of materials known or suspected to contain dioxins, dibenzofurans, radioactive material, and high level PCBs. Special storage requirements for legal, project or other reasons will be met upon request.

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All refrigerators and freezers used for sample and standard storage contain thermometers immersed in glycerol. The temperature of each refrigerator or freezer is recorded at least once a workday according to instructions in SOP 99-TEMP.

The thermometers used in the refrigerators and freezers will be calibrated against a NIST certified thermometer reference standard which is used for calibration only, and for no other purpose, once a year at a minimum of two points surrounding the temperature range of the thermometer being calibrated according to instructions in SOP 09-TCAL. A hardbound logbook will be kept for recording the temperatures. The calibrations of the thermometers will be recorded in logbooks. The NIST certified thermometers will be returned to the manufacturer once every three years for recalibration.

15.3. Subcontracted Analyses

There are occasions when particular laboratory analyses cannot be completed in-house by ALSI. This may occur because the laboratory does not have the necessary instrumentation, equipment or certification to perform the analyses. ALSI also subcontracts overflow work as necessary when instrument problems occur or physical capacity is exceeded. Prospective subcontracting firms are thoroughly reviewed with an emphasis on their quality control program and associated certifications. A register of all approved subcontractors is retained in the QC Department. ALSI will ensure that the laboratory receiving the subcontracted work maintains the necessary certifications and level of quality to perform the work to project specifications.

ALSI advises its Customers in each proposal of its intention to subcontract any portion of the testing to a third party. If it is necessary to subcontract work as a result of unforeseen circumstances, Customers will be contacted by their Customer Service Representative to gain their permission. This is documented on the Chain of Custody. When samples are sent, they are shipped to an appropriately certified subcontracting firm from ALSI's Sample Receiving department and the results of the analyses are transmitted back to ALSI for review. Any subcontracted analysis is noted as such on ALSI's final laboratory analysis report with an identification of the appropriate subcontractor. The original subcontractor analysis reports may also be attached to the associated ALSI Laboratory Analysis Report.

Samples requiring NELAP certification will be shipped to an ALSI approved laboratory accredited under NELAP for the tests to be performed and/or with a laboratory that meets applicable statutory and regulatory requirements for performing the tests and submitting the results of tests performed.

16. Laboratory Facilities and Equipment

16.1. General Description

ALSI is located on a one-acre lot on the north side of PA Route 283, five miles southeast of Harrisburg. ALSI's address is 34 Dogwood Lane, Middletown, PA 17057. The building has an area of approximately 16,000 square feet on two levels. The lower level contains the metals, wet chemistry, administrative sales office, QA department, computer office, sample storage, gas storage, chemical and waste storage areas (see Appendix D, Figure 1). The upper level contains the GC, GC/MS, sample preparation and sample receipt laboratories, sample storage areas, customer service and administrative offices (see Appendix D, Figure 2).

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16.2. Security

The building has fire and smoke alarms and an electronic security system that are monitored by ADT. During weekends and off-shift hours the electronic security system is used to prevent unauthorized entry into the building. At approximately 7 p.m., the doors providing access to the building are locked and are kept locked until approximately 7 a.m. Any non-employee wishing to enter the building during these hours must use the door buzzer and wait for an employee to permit them access. All visitors, during both business hours and off-shift hours, must sign in and out at the receptionist's desk. The employee whom they are visiting will be notified of their presence and will come to the lobby to escort the visitor to the appropriate office or lab. People dropping off samples for analysis (and who do not leave the reception area) and field samplers entering the building for the sole purpose of dropping off samples in the Sample Receipt area will not need to sign in.

16.3. Laboratory Accommodations

ALSI has made great efforts to ensure that laboratory accommodations including lighting, temperature, ventilation, and energy sources are consistent to facilitate proper performance of testing in all areas. Temperature and humidity are important factors in the operation of instrumentation in the laboratory. All areas of the laboratory have separate temperature controls in order to allow for optimal adjustment of these factors. Certain areas of the laboratory contain controls for temperature and humidity due to the operational and test method regulation specifications of the specialized equipment contained in those areas.

Regarding ventilation, extra provisions have been developed in order to provide Customers with a greater assurance that their samples are being processed in a professional and quality environment. These include such things as maintenance of a negative air pressure in the preparatory laboratories and a net positive pressure in the organic laboratories and hallways leading to the preparatory laboratories. Additionally, access to and use of neighboring areas where activities are incompatible is controlled. This ensures that any solvent contamination resulting from sample extraction processes is kept out of the analysis laboratories. In addition, all fume hoods meet OSHA standards for face velocity, and good housekeeping practices are maintained throughout the laboratory. This helps to ensure the safety of ALSI employees as well as the integrity of Customer samples.

16.4. Waste Management

ALSI conducts waste management practices consistent with all applicable EPA rules and regulations. Spent reagents, samples and method process wastes are characterized and disposed of in an acceptable manner. Reference SOP 19 – Waste Disposal for information regarding ALSI's waste management procedures.

16.5. Pollution Prevention

Pollution prevention encompasses any technique that reduces or eliminates the quantity or toxicity of waste at the point of generation. Numerous opportunities for pollution prevention exist in laboratory operations. Management shall consider pollution prevention a high priority. Extended storage of unused chemicals increases the risk of accidents. The laboratory shall consider smaller quantity purchases which will result in fewer unused chemicals being stored and reduce the potential for exposure by employees. ALSI tracks chemicals when received by recording their receipt in a traceable logbook. Each chemical is then labeled according to required procedures and stored in assigned locations for proper laboratory use.

16.6. Deionized Water

Deionized water is used for all analyses performed in the laboratory. Deionized water is provided to each individual laboratory by a laboratory-wide circulation system that has been designed and is currently

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serviced by an outside vendor. This system consists of tap water being introduced first to a sediment cartridge, with a 1-micron pore size, which is used for particle elimination, then to carbon filters, which are used for removal of chlorine and organic contaminant. Water is circulated through three ion exchange tanks, containing anion and cation resins that are used to deionize water, and an ultraviolet sterilizer, which is used to provide control of bacteria. A polishing tank containing mixed anion and cation resins is also used as a final deionizing source and to act as a safeguard to maintain the quality of the water before and during servicing. Finally, water flows through a 0. 2-micron filter to remove any colloidal silica before distribution to all areas of the laboratory. This system provides quality water with a resistivity reading of greater than 18.0 MΩ·cm. The deionized water system is equipped with a continuous resistivity monitor. The readings are monitored and recorded daily. The conductivity of the water is determined and recorded at least weekly by the water quality department. ALSI SOP 19-H_2OMON provides details concerning the monitoring of the deionized water system.

16.7. Gas Storage

A separate gas storage room contains the necessary specialty gases that are required for specific analytical equipment. The gases leave the centralized storage room through individual lines leading to the analytical departments. Other non-flammable gas tanks can be found in wet chemistry, GC-Volatiles, and GC-Semivolatiles. All gas tanks are properly secured with chains and department personnel are trained in proper handling.

16.8. Instrumentation

The laboratory has a full complement of instrumentation and support equipment such as fume hoods, refrigerators, freezers, ovens, balances, a deionized water system, etc., required for the correct performance of all tests. All instruments are maintained by trained employees and/or by manufacturer's service personnel. Reference materials, including instrumentation manuals provided by the manufacturer, are available to provide instruction in the proper use of the instrumentation. A complete listing of instrumentation and equipment is included in Appendix E.

16.9. Instrument Maintenance

ALSI personnel can accomplish preventative maintenance as well as some repairs on-site. ALSI also maintains some service agreements with instrument manufacturers to further ensure the operational viability of all equipment.

All maintenance and servicing done on instruments and equipment is recorded in hardbound notebooks. The instrument logs contain general information about the instrument, including the name of the manufacturer, instrument model, serial number, date of purchase, date placed into service, current instrument location, condition when received (e.g., new, used, reconditioned), and information concerning any service contracts maintained. They also contain information concerning any routine maintenance done by ALSI personnel. Information concerning routine maintenance should include a brief description of the maintenance performed, the frequency required, the date performed, and the initials of personnel performing the maintenance and any comments concerning the procedure. Also contained in the log is information concerning repairs done by ALSI personnel or instrument manufacturers. This information includes the date of servicing, the initials of personnel performing the service, record of why it was done and the results of the servicing relative to instrument performance. The individual logbooks are located in the laboratory with the instruments to which they pertain along with copies of manufacturers instructions, where available. Once a logbook is filled, a new logbook will be started. The general information about the instrument and the routine maintenance required will be transferred over to the new logbook. The old logbook may remain in the laboratory for at least one year so that the analysts may use it as a reference. When removed from the department the old logbook will be put into storage, where it will be kept for a minimum of five (5) years.

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It is the responsibility of the section leaders to determine the effect, if any, of an instrument defect on previous results. If an effect has been determined that questions the validity of any sample results, the QA Manager is notified and the corrective action procedure is followed.

16.10. Instrument Calibration

All instrumentation must be calibrated prior to use. The initial calibration determines the working range of the instrument by measuring the analytical response in relation to the amount of analyte present. All initial calibrations are method specific, and may be comprised of a single point or multi-points. The type of calibration performed depends on the type of instrumentation and the method of analysis in use. Step by step calibration procedures are outlined in detail in each Standard Operating Procedure. Also included is the frequency of calibration required and the materials needed to perform each calibration. Only standard reference materials as defined in section 8.2 are used for calibration.

All initial calibrations are verified for accuracy by analysis of a second source standard. This is a check standard prepared from a reference material procured from a different source than that used for the calibration. This provides verification that the calibration standard has been prepared at the correct concentration.

All initial calibrations are controlled by analysis of continuing calibration standards and/or QC check samples. These are method specific or mid-range level calibration standards that are analyzed at specific frequencies as established by the method. The amount of analyte recovered is compared to the acceptance criteria of the method. Acceptable recoveries verify the stability of the calibration and lack of instrument drift throughout the analysis. If the acceptance criteria are not met, method specific corrective action must be taken.

17. Data Verification Procedures

17.1. Data Quality Objectives

The data quality objectives discussed below ensure that data will be gathered and presented in accordance with procedures appropriate for its intended uses, and that the data will be of known and documented quality able to withstand scientific and legal scrutiny. The quality of the measurement data can be defined in terms of completeness, accuracy, precision and traceability.

17.1.1. Completeness

Completeness is defined as the percentage of measurements that are judged to be valid measurements. Factors negatively affecting completeness include the following: sample leakage or breakage in transit or during handling, missed method prescribed holding times, lost sample during laboratory analysis through accident or improper handling, improper documentation such that traceability is compromised, or rejection of sample results due to failure to conform to QC criteria specifications.

17.1.2. Accuracy

Accuracy is the measure of agreement between an analytical result and its "true" or accepted value. Deviations from a standard value represent a change in the measurement system. Potential sources of deviations include (but are not limited to) the sampling process, sample preservation, sample handling, matrix effects, sample analysis and data reduction. Sampling accuracy is typically assessed by collecting and analyzing field and trip blanks for the parameters of interest. Analytical laboratory accuracy is determined by comparing results from the analysis of laboratory control samples or check standards to their known values. Accuracy results are generally expressed as percent recovery.

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17.1.3. Precision

Precision is the determination of the reproducibility of measurements under a given set of conditions, or a quantitative measure of the variability of a group of measurements compared to their average value. Precision is typically measured by analyzing field duplicates and laboratory duplicates (sample duplicate, matrix spike duplicate, check standard duplicate and/or laboratory duplicate). Precision is most frequently expressed as standard deviation, percent relative standard deviation or relative percent difference.

17.1.4. Traceability

Traceability is the extent to which reported analytical results can be substantiated by supporting documentation. Traceability documentation exists in two essential forms: those which link the quantitation process to authoritative standards and those which explicitly describe the history of each sample from collection to analysis and disposal.

17.2. Laboratory Quality Control Definitions

Technical personnel are responsible for complying with all quality assurance/quality control requirements that pertain to their technical functions. ALSI uses the following internal quality controls to verify that the data produced by the laboratory has the required degree of accuracy and precision and is free from contamination due to laboratory processes. All samples are normally processed in preparation and analytical batches of no more than 20 samples per batch. The following quality control checks defined below are appropriate for the various methods performed in the laboratory. Individual SOPs will further define the specific checks to be analyzed with each method. Additionally, a Customer's individual Quality Assurance Project Plan may require the laboratory to include additional checks for analysis depending on the *site* requirements.

17.2.1. Method Blank

A method blank is an analytical control consisting of all reagents, internal standards, and surrogate standards that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination contributed from the preparation or processing of the sample.

17.2.2. Reagent Blank

A reagent blank is an analyte-free sample that contains all the reagents used in a particular method. It is prepared and analyzed to determine if contamination is present at detectable levels that can be attributed to the reagents used in the process.

17.2.3. Field Blank

A field blank consists of reagent water that is transported to the sampling site, transferred from one vessel to another at the site, and preserved with the appropriate reagents. This serves as a check on reagent and environmental contamination.

17.2.4. Trip Blank

A trip blank consists of reagent water that is transported to the sampling site and returned to the laboratory without being opened. This serves as a check on sample contamination originating from sample transport, shipping, and from the site conditions. The holding time for the trip blank begins when received by the laboratory, unless otherwise specified by the client, such as time field samples were collected.

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17.2.5. Refrigerator / Storage Blank

Refrigerator storage blanks are placed in VOA sample storage refrigerators and routinely analyzed for full Volatile Organic Analytes/Target Compound List (VOA-TCL) analytes by GC and GC/MS. These blanks monitor the volatile storage refrigerators for presence of sample cross-contamination.

17.2.6. Quality Control Reference Sample or Calibration Verification Standard (Second Source Standard)

A QC reference sample is a sample prepared from a source other than that used for calibration at a concentration within the calibration range. It is used to verify that the calibration standards were prepared accurately. It is analyzed after every initial calibration performed in the laboratory.

17.2.7. Laboratory Control Sample (LCS/LFB)

A Laboratory Control Sample (aka Laboratory Fortified Blank) is a laboratory blank fortified at a known concentration. Aqueous and solid LCSs are analyzed using the same sample preparation, reagents, and analytical methods employed for the samples. An LCS is analyzed with each preparative or analytical batch as required by the method. It provides a measure of the accuracy of the analytical system in the absence of matrix effects.

17.2.8. Surrogate Standards

Surrogates are organic compounds which are similar to analytes of interest in chemical composition, extraction, and chromatography, but which are not normally found in environmental samples. These compounds are spiked into all blanks, calibration and check standards, samples (including duplicates and QC reference samples), and spiked samples prior to an organic analysis. Percent recoveries are calculated for each surrogate to detect problems in the sample preparation process and monitor the efficiency of the process.

17.2.9. Duplicate

A duplicate is a second aliquot of a sample that is prepared and analyzed in the same manner as the original sample in order to determine the precision of the method. Samples selected for duplicate analysis are rotated among Customer samples so that various matrix problems may be noted and/or addressed. Poor precision in a sample duplicate may indicate a problem with the sample composition and shall be reported to the Customer whose sample was used for the duplicate analysis. Precision is measured as relative percent difference as determined using the following formula:

$$\%RPD = (((S - D) / (S + D)) / 2) * 100\%$$

where: S = Sample Result
D = Duplicate Result

17.2.10. Matrix Spike/Matrix Spike Duplicate

A matrix spike/matrix spike duplicate is the addition of a known amount of a target analyte to a sample that is subjected to the entire analytical procedure. Samples selected for matrix spiking are rotated among Customer samples so that various matrix problems may be noted and/or addressed. Poor performance in a matrix spike may indicate a problem with the sample composition and shall be reported to the Customer whose sample was used for the spike. Accuracy is determined by calculating the percent recovery.

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17.2.11. Method Detection Limit (MDL)

The constituent concentration that, when processed through the complete method, produces a signal with a 99% probability that it is different from the blank. For seven replicates of the sample, the mean must be 3.14 above the blank where σ is the standard deviation of the seven replicates.

17.2.12. Reportable Detection Limit (RDL) / Practical Quantitation Limit (PQL)

The reportable detection limit on the laboratory report is a concentration at which the laboratory reports results. The RDL can be either the practical quantitation limit or the method detection limit based on the Customers needs. By convention, the practical quantitation limit is the default RDL presented on the laboratory report. It is laboratory policy to indicate on the laboratory report when the method detection limit is used as the RDL.

17.2.13. Common Laboratory Contaminants

Some common laboratory contaminants include: methylene chloride, acetone, 2-Butanone, hexane, phthalates, aluminum, and zinc. These analytes are sometimes seen in laboratory blanks due to their use in the processing of samples. When blank contamination occurs it is required that samples associated with these blanks are reprocessed. However, if reprocessing cannot occur due to lack of sample, holding time issues, or Customer turnaround time a comment will be placed on the analytical report defining the problem.

17.3. Proficiency Testing (PT) Samples

These reference materials provided by the EPA, state agencies, government agencies or certified commercial vendors monitor accuracy performance of the laboratory on a regular basis. It is an essential part of ALSI's quality program to maintain accreditation and certification by regulatory agencies. It is laboratory policy to analyze and report PT samples as if they were regular compliance samples. This includes analysis of all methods under the Scope of Work for NELAC and includes all matrices presently accredited for by both NELAC and non-NELAC state agencies. Proficiency on PT samples measures performance of our analytical capabilities. Participation in these programs provides the laboratory with evidence of correlation of results with other laboratories and national standards. Proficiency testing results are filed and archived for at least ten (10) years. ALSI participates in the following programs:

Program	Sample Type	Frequency
In-house Blind Study	Organics/Inorganics/Metals	Quarterly
Water Pollution Study (WP) provided by a NELAC and/or NIST approved provider	Organics/Inorganics/Metals/Microbiology	Semi-annually
Water Supply Study (WS) provided by a NELAC and/or NIST approved provider	Organics/Inorganics/Metals/Microbiology	Semi-annually
Discharge Monitoring Report provided by a NELAC and/or NIST approved provider	Inorganics/Metals	Annually

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Program	Sample Type	Frequency
U.S.A.C.E.	Organics/Inorganics/Metals	As required
Laboratory Soil Proficiency Testing Program	Organics/Inorganics/Metals	Semi-annually

17.4. Quality Control Charts

Control limits are used by ALSI to establish method performance of a given analysis and to monitor trends of QC results graphically over time. These limits also allow for the development of acceptance criteria where no method or regulatory criteria exist. Each analytical department records control limits and calculates the upper and lower control limits. Warning limits are at plus and minus two standard deviations, and control limits are at plus and minus three standard deviations.

Documented acceptance limits are available before an analysis is begun based upon continuing statistical evaluation of data generated by the analysis of quality control samples or specific minimum acceptance limits established by the method and/or Standard Operating Procedure. This allows any out-of-control parameters to be detected before data is reported. If the Out-of-control parameter is judged to be sample related, the analysis may continue. The corrective action policy must be followed, and the result reported with a comment qualifying the results.

When the analyst deems an analysis out of control, the reason for the out-of-control situation is investigated immediately. The response to the out-of-control situation will depend on the analysis and the SOP shall be consulted. In addition, the supervisor is informed of the problem and he/she does not allow any further analyses until the problem has been corrected. Corrections may include re-assay of the check samples, recalibration, instrument maintenance or other SOP mandated operations. If it is necessary to report results obtained when the system is judged to be out-of-control, the corrective action policy will be followed, and the data will be flagged on the laboratory analysis report and a qualifying comment will be attached.

17.5. Method Detection Limits

Method detection limits (MDLs) are determined and documented in accordance with federal guidelines contained in 40 CFR Part 136 Appendix B. The detection limit is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix. The statistical procedure allows for computation of method detection limits based upon a minimum of seven analyses of a check sample that is prepared at a concentration between 1 and 5 times the estimated MDL. Once an MDL study has been performed, the MDL concentration observed is deemed acceptable if it is between 1 and 10 times the concentration spiked. The procedure outlined in SOP 99-MDL explains in detail the procedure to be followed.

Method detection limit studies are performed where appropriate for each method and matrix of concern during initial method validations or when a major change in operating conditions or instrument configuration occurs. When an MDL is not required for any analyte for which spiking solutions or quality control samples are not available, the laboratory will not report a value below the Reporting Limit. A study will be performed at least once per year for most methods to maintain adequate records of the method's performance.

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For Department of Defense (DoD) it is required that all method detection limits be verified. In verifying the MDL, all requisites for analyte detection must be met. The validity of the MDL is confirmed by qualitative identification of the analyte(s) in a QC sample in each quality system matrix containing the analyte at no more than two (2) to three (3) times the MDL for single analyte tests and one (1) to four (4) times the MDL for multiple analyte tests. This verification is performed on every instrument that will be used for analysis of samples and reporting of data. For more information regarding the verification of MDLs, see the DoD Quality Systems Manual, Version 3, dated January 2006.

Reporting Limits or Practical Quantitation Limits are defined as the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. These are listed on all lab reports along with the analytical result. They are determined by multiplying the calculated Method Detection Limit by two (2) to five (5) times and incorporating a safety factor that is developed using guidance from recovery studies and blank concentrations, or by reporting the lowest standard of the initial calibration curve. The laboratory is required to calculate the Method Detection Limit by three (3) to five (5) times for Department of Defense (DoD) contracts.

17.6. Data Reduction, Validation and Reporting

ALSI has an established sequence of approvals that analysis results undergo before being issued to a Customer on a final report as described in SOP 99-DATA. Each step in the process is initialed and dated upon completion. The individual analyses on the report are initially reviewed by the analysts while performing the testing. The analyst ensures that all quality control information is in control and correct. The laboratory supervisor or designee responsible for that particular analysis then reviews the data generated by the analyst. The supervisor or designee reviews the raw data including sample and QC data. The records are checked for SOP compliance and calculation errors. This check is documented on the raw data. Once all the data has received approval by the supervisors or designees, results are entered into the LIMS. Once all inorganic results of an analytical batch have been entered, they are checked by a second analyst for transcriptional errors and completeness. Once all results are confirmed to be reported accurately, the data are approved and the report is marked as complete in the LIMS. Organic data and some inorganic data is electronically uploaded and does not need to be checked for transcriptional errors and completeness. Once all of the data for a workorder has been entered into the LIMS and the data reviews by the sections have all been completed, the workorder is scheduled to print automatically by the LIMS during the next print run. The report is then printed with the electronic signature of the Technical Director. If at any point in the data reduction, validation, and reporting process, an error is found in the data entered into the LIMS, the error will be corrected and the correction will be noted in an audit trail function in the LIMS system. The LIMS will document the sample number, the correction that was made, the reason for making the correction, the date and time the correction was made and the initials of the person making the correction.

All of the information necessary for the interpretation of the test results and all information required by the methods used is included on the report. The report lists the laboratory sample number, Customer name and address, project name, the project number, location identification, sample state, sample collector, purchase order number (if available), date and time (if available) sampled, date received, and a discard date. This information is included in the heading of the report. In the actual body of the report, the test/parameter being analyzed is listed along with the result, units, reporting limit and method reference. Also included may be "line item comments" where a comment is attached directly to a particular result, and "sample comments" where comments are attached at the end of a report. These comments will indicate any out of the ordinary circumstances such as a method non-conformance or interference problem. At the end of the report is included the percent recovery of any surrogate standards used.

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The front page of the report supplies additional information not included in the body of the report. This information includes the definitions of qualifiers used in reporting sample results, laboratory certification information and the signature of an approved signatory.

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Once a final report has been approved, only the Operations Manager, the Technical Director, the QC Manager and the customer service representatives have the access to change the report. If changes need to be made to a report that has already been transmitted to the Customer, a comment will be put on the report as to what change was made, the date it was made and the initials of the person making the change.

If additional tests are requested on a sample that has been started but not finished by the laboratory, the test request will be added to the appropriate sample in the LIMS. Additional tests for a laboratory sample will be added by either the Operations Manager, Technical Director, sample custodian or the customer service representative.

17.7. Data Deliverable Reporting

ALSI is capable of developing a variety of data deliverable reports. For all deliverables produced, the hardcopy data is scanned, a CD ROM is maintained by the QC department in a secure location for data processed prior to 09/2004, and data processed
post-09/2004 is stored electronically. All packages are organized and assembled on a specific basis in order to comply with the Customer's regulatory or project specific requirements. They are reviewed for completeness and compliance by a QC Officer and verified by validation within the QC department. Shipments of deliverable packages are documented by the QC Office and sent by the Project Manager through a commercial carrier. In general, ALSI Deliverables contain:

- Case Narrative – Information on sample types, tests performed, any problems encountered, and general comments.
- Analytical Data – Data are reported by sample with the appropriate significant figures and reporting limits, and have been adjusted for dilution, if appropriate. Pertinent information including dates sampled, received, prepared, extracted, and analyzed are provided in the data package.
- Laboratory Performance QC Information – The summary results and raw data of LCSs and method blanks analyzed with the project are provided. Any data or QC anomalies are discussed in the narrative or are listed as comments on the analytical report.
- Matrix Specific QC Information – The summary results and raw data of any sample duplicates and MS/MSDS analyzed with the samples as specific QC are provided. Any additional project specific QC requested by the Customer is also reported. All QC results include supporting information such as concentration of the spike, percent recovery, and percent difference/RPD.
- Methodology – References to analytical methodology used is cited in the deliverable package.

17.8. Electronic Data Deliverables

The generation of Electronic Data Deliverables (EDD) from the Horizon LIMS is accomplished with the use of a custom written computer routine written by in-house programmers. A variety of EDD formats are available at the Customer's request and specific formats required by a Customer's QAPP can be formatted and incorporated into the ALSI EDD generator.

18. Corrective Actions and Feedback

When a system or performance audit indicates a deficiency, when established quality control limits are violated, or when professional judgment by an experienced analyst indicates that a result may be

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inaccurate, corrective action is necessary. Corrective actions are measures taken to correct a problem, which may adversely affect the quality of a reported result, and to prevent its reoccurrence if possible. Corrective action may consist of, but is not limited to, things such as re-preparation of a sample, reanalysis of a sample, maintenance of malfunctioning equipment, revision of standard operating procedures, qualification of a sample result with a detailed explanation, or re-training of personnel. See SOP 99-CorrA for details concerning the corrective action documentation procedure.

An experienced analyst, upon review of raw data, is expected to use professional judgment when accepting and rejecting results of an analysis. In cases in which an analysis successfully passes all method QC requirements, an analyst may use professional experience to judge the sample result questionable. This may be due to previous sample history, lack of correlation between results of multiple test methods performed, or general dissatisfaction with the result obtained. In these cases analysts are given the authorization to reanalyze the sample as a form of corrective action. In all cases of re-analysis, it must be documented clearly in the raw data which results were reported to the Customer.

If corrective action is required because routine data quality assessments are out-of-control, such as surrogate recoveries below acceptable limits or duplicate relative percent difference values above acceptable limits, the data is evaluated on a sample-by-sample and/or batch basis. Data is evaluated with respect to SOP criteria and the corrective action may be limited to rejecting the sample or batch or accepting it and reporting the result with a qualifying comment on the Lab Analysis Report. The decision that is made is indicated on the raw data, such as on the analytical worksheet or in the laboratory data book. If a quality control violation is judged to be matrix related, a Sample Non-conformance Form is completed (see Figure 7) and filed with the raw data. If a quality control violation is judged to be non-matrix related, a Corrective Action Form is completed (see Figure 5). If a trend is not observed during the course of data validation, additional corrective action or documentation is not necessary.

If the corrective action is required because of a systemic deficiency or if a situation occurs affecting data usability for more than one batch (i.e., standards preparation errors), a more global assessment must be made. In these cases, the deficiency, along with the corrective actions initiated, are recorded on a corrective action form. The corrective action documentation shall be completed by the department supervisor or his designee and contain a root cause analysis including what occurred, immediate action taken, cause and long term corrective action to be taken to prevent the reoccurrence of the deficiency in the future. The corrective action report will be reviewed by the Quality Control Department and the process monitored to ensure that implementation of the corrective action is complete.

If at any point in ALSI's system it becomes evident that an error has occurred (either human or instrumental) which may have jeopardized the validity of reported results, the Quality Assurance Manager, Operations Manager and appropriate Project Manager are notified immediately. The Customer Service Representative makes an initial phone call or a letter is distributed immediately to all potentially affected Customers defining the error. This letter or documented phone call will address the specific tests and samples involved and define the effect that the suspected problem would have on issued results. After a thorough review by the QA Manager, a letter may be sent more thoroughly defining the problem and associated resolution. All problems are also documented on a Corrective Action Form as explained in the Corrective Action SOP (99-Corr).

18.1. Preventive Action

Preventive actions are long-term improvements the laboratory makes to prevent non-conformances.

The Quality Assurance Manager tracks all external and internal non-conformances on a monthly basis. Based on this review the Quality Assurance Manager shall make the determination if there are any apparent problems or trends that need to be addressed within the laboratory operations. If necessary,

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system audits an/or method audits will be performed as a result of this review. The President and/or Laboratory Director will become involved where changes are required in personnel, instrumentation or procedures.

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ALSI encourages all employees to contribute their ideas on issues relating to facility and system improvements, increased efficiency, waste elimination, ensuring a safe working environment and improving customer satisfaction while maintaining a high level of quality. For this purpose we have available a "suggestion box" that is centrally located and accessible to all laboratory personnel. Suggestions are evaluated for merit and regularly discussed with upper management.

The laboratory encourages both positive and negative customer feedback. This feedback is used and analyzed to improve the management system, testing, calibration and project management activities. Customer satisfaction surveys are an example of the type of feedback used. Analysis of these evaluations are used to incorporate continued improvement of the ALSI management system. Customer feedback combined with audit results, analysis of data, and corrective and preventive actions are discussed during management reviews and when necessary, new policies established to meet our customers needs on a consistent basis.

19. Departure From Procedure

There are occasions when it becomes necessary to deviate from documented policies and procedures. When a deviation is necessary, prior evaluation and approval by the Operations Manager and Technical Director is required and the customer must be notified. Customer approval can be granted verbally or in writing, but in all cases is documented. A comment states the specifics of the deviation, the applicable test(s) and the reasoning for the deviation. This comment appears on the final lab report. Deviations from SOPs will be noted with the appropriate initials and date in the lab notebook. All departures from procedures are documented on corrective action forms filed in the QA office.

20. Complaints

All complaints, whether initiated by Customers, or generated internally are taken seriously. All complaints are handled according to the Standard Operating Procedure SOP 99-Complaints. This procedure outlines the steps taken to process complaints in the laboratory.

An external complaint consists of any non-compliance with customer's project specifications as indicated by the Customer. Upon receipt of an external complaint, an External Complaint Form is initiated (See Figure 8). Information such as customer name, Customer contact, date/time, applicable COC numbers, and the ALSI contact are documented. The specific items discussed are also documented. If an appropriate resolution can be worked out immediately with the Customer, that too is documented. Otherwise, the External Complaint Form is submitted to management for determination of an appropriate resolution. The finalized External Complaint Form is submitted to the QA Office for review and distribution. All external complaints are recorded and kept on file and archived in the QA office.

An internal complaint consists of any grievance, concern, or data quality related issue. All employees have access to Internal Complaint Forms in the Business Office at all times (see Figure 9). The Internal Complaint Form can either be returned to the laboratory "*suggestion box*" anonymously or submitted in person to the Human Resource Manager. All forms are reviewed, investigated, and distributed for resolution by the Human Resource Department.

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21. Confidentiality, Proprietary Rights, and Transfer of Ownership

21.1. Confidentiality and Reporting

The confidentiality of Customer information is strictly maintained through rigid controls. Reports and information are issued only to the Customers who have submitted the work except as otherwise indicated by the Customer. The laboratory will sign an acceptable confidentiality agreement as required. Copies of the final laboratory report, mailed via regular mail, are covered in the analysis fees. Additional copies of reports sent to another address may be charged per copy. Charges for express mail services, sample shipping, and fax services are extra.

21.2. Limitation of Liability

Notwithstanding any other provision herein, ALSI's liability and Customer's exclusive remedy for any cause of action arising hereunder, whether based on contract, negligence, or any other cause of action, shall be limited to the compensation received by ALSI from the Customer for the services rendered therewith. All claims, including negligence or any other cause whatsoever shall be deemed waived unless made in writing and received by ALSI within ninety (90) days after ALSI's completion of the services provided.

21.3. Transfer of Ownership

In the event of a transfer of ownership of the laboratory, the new owner will agree in writing, which shall be either stipulated in a purchase agreement or as a separate record retention document, that the current records shall be maintained for a period of not less than five (5) years.

In the event of a laboratory closure, the current owner/management will notify in writing all Customers for whom the laboratory performed sample analysis within the last ten (10) years that the laboratory will be closing. This letter will instruct the Customers to contact the laboratory to provide instructions on how previous records are to be transferred to the Customer's care.

22. Audit and Review

22.1. Audits from Regulatory Agencies

As a participant in state and federal certification programs, the laboratory is audited by representatives of the regulatory agency issuing certification. Audits are usually conducted on an annual or bi-annual basis and focus on laboratory conformance to the specific program protocols for which the lab is seeking certification. The auditor reviews sample handling and tracking documentation, analytical methodologies, analytical supportive documentation and final reports. The audit findings are formally documented and submitted to the laboratory for corrective action within an agreed upon time frame. All audit reports are filed and archived for at least ten (10) years.

22.2. Internal Audits

The QA Manager or experienced designee is responsible for performing internal audits. All technical laboratory sections of ALSI are required to participate in these internal audits annually. The procedure for performing these internal audits is outlined in SOP 99-Intaudit. The findings of these audits are to be formally documented and submitted to the laboratory management. The Quality Assurance Manager, Operations Manager, Technical Director and/or Laboratory Supervisors will have the responsibility for resolving points at issue or for effecting the necessary corrective actions to resolve any deficiencies found during the audit. The mandated timeframe for responding to an internal audit will be two (2) weeks from receipt of the audit report, issued to the department, by the Quality Control Manager. After implementation of corrective action(s), the quality control department will monitor the progress and

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ensure that the root cause was eliminated and that the corrective actions taken were effective in overcoming the nonconformance.

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The audit program is to focus on the following areas:

- Maintenance of acceptable and complete SOPs in company format.
- Maintenance of training records.
- Maintenance of notebooks.
- Maintenance of instrument records.
- Evaluation of standard control records.
- Evaluation of sample handling procedures.
- Evaluation of data handling and storage procedures.
- Evaluation of computer competency.

In response to internal audit findings the laboratory shall take the necessary corrective actions to resolve any problems found. Documentation of these corrective actions shall be in the form of a written response and include the following points:

- Statement of the Problem as defined from the audit report.
- "Root Cause" Analysis following investigation.
- A plan of action to correct the problem.
- Steps for implementing the corrective action plan.
- Demonstration of implementation of the corrective action taken.

When audit findings cast doubt on the effectiveness of the operations or on the correctness or validity of the laboratory's environmental test results, the laboratory shall take immediate corrective action and the President shall be notified. The Customer will be notified in writing within 24 hours of discovery, whenever investigations show that their laboratory results are impacted.

Discovery of evidence of inappropriate actions or vulnerabilities related to data integrity shall be investigated. Any investigation that results in findings of inappropriate activity shall be considered a violation of the ALSI "Ethics Credo". Actions taken shall include the following: immediate disciplinary action, corrective action, and appropriate Customer notification, if necessary. All documentation relating to an investigation shall be maintained for five (5) years.

22.3. Management Quality Review

A review of the entire quality system is to be carried out annually. The QA Manager, Operations Manager, Technical Director, Chief Financial Officer and President will have the responsibility for resolving points at issue or for effecting necessary changes to the laboratory's quality assurance practices within an agreed upon time frame.

The purpose of these reviews is to discover:

- whether management objectives (as defined by the quality system) are being met
- whether designated duties are being carried out satisfactorily
- whether procedures described in the quality system are being followed
- opportunities for quality improvements
- requirements for capital expenditures

The review includes:

- matters arising from the previous review
- assessment reports from state,national or third party accrediting agencies

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- reports from audits by Customers
- reports from supervisory personnel
- corrective action summaries
- results of internal audits done since the last review, including corrective actions implemented
- results of participation in proficiency testing
- results of in-house quality checks
- details of any complaints from Customers
- staff training (for both new and existing staff members)
- adequacy of staff, equipment and facility resources
- future plans and estimates for new work, new staff, new equipment, etc.

22.4. Audit Response

The laboratory is required to respond with corrective action to any audit findings and recommendations of regulatory agencies before certification for a particular program can be granted. If a recommendation is related to document format, then the laboratory personnel will revise the document format and a copy of the revised document format will be submitted to the appropriate representatives of the regulatory agency. If a recommendation is related to an actual procedure, then the recommendation will be communicated to the laboratory personnel informing them of the correct procedure and a record of this communication will be submitted to the appropriate representatives of the regulatory agency. If a recommendation is related to the written procedures, then the laboratory personnel will revise the written SOPs and a copy of the new SOPs will be submitted to the appropriate representatives of the regulatory agency. The Quality Assurance Manager will conduct a follow-up to verify that corrective action has been implemented. All audit responses are filed and archived for at least ten (10) years.

23. Uncertainty of Measurement

The uncertainty components, which are of importance to a given procedure, must be accounted for using appropriate methods of analysis. Therefore, the laboratory must determine the uncertainty attributed to all steps in a testing procedure. These include uncertainty imposed by equipment, calibration, standards, reagents, preparation, cleanups, etc. Since for most analytical procedures, the laboratory control sample (LCS) is subject to the entire process of preparation through analysis, all procedural elements that would contribute to uncertainty will be inclusive in the overall LCS results. The LCS is performed with every batch of samples where appropriate for the method.

Measurement uncertainty is a statistical accuracy calculation equal to twice the standard deviation of the LCS recoveries for a given continuous set of LCS recoveries. This statistical observation is reported as standard deviation by percentage. Although there is no requirement that measurement uncertainty be reported with sample results, if requested by a Customer, it would be applied by multiplying the determined analyte concentration by the uncertainty percentage.

23.1. Measurement Uncertainty Calculation for Reporting

Uncertainty (at 95% confidence level, K=2) can be expressed as:
$X (1 \pm 2S_r)$

Where:
X is the analytical result
Sr is the relative standard deviation of the LCS data

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Appendix A – ALSI Organizational Chart

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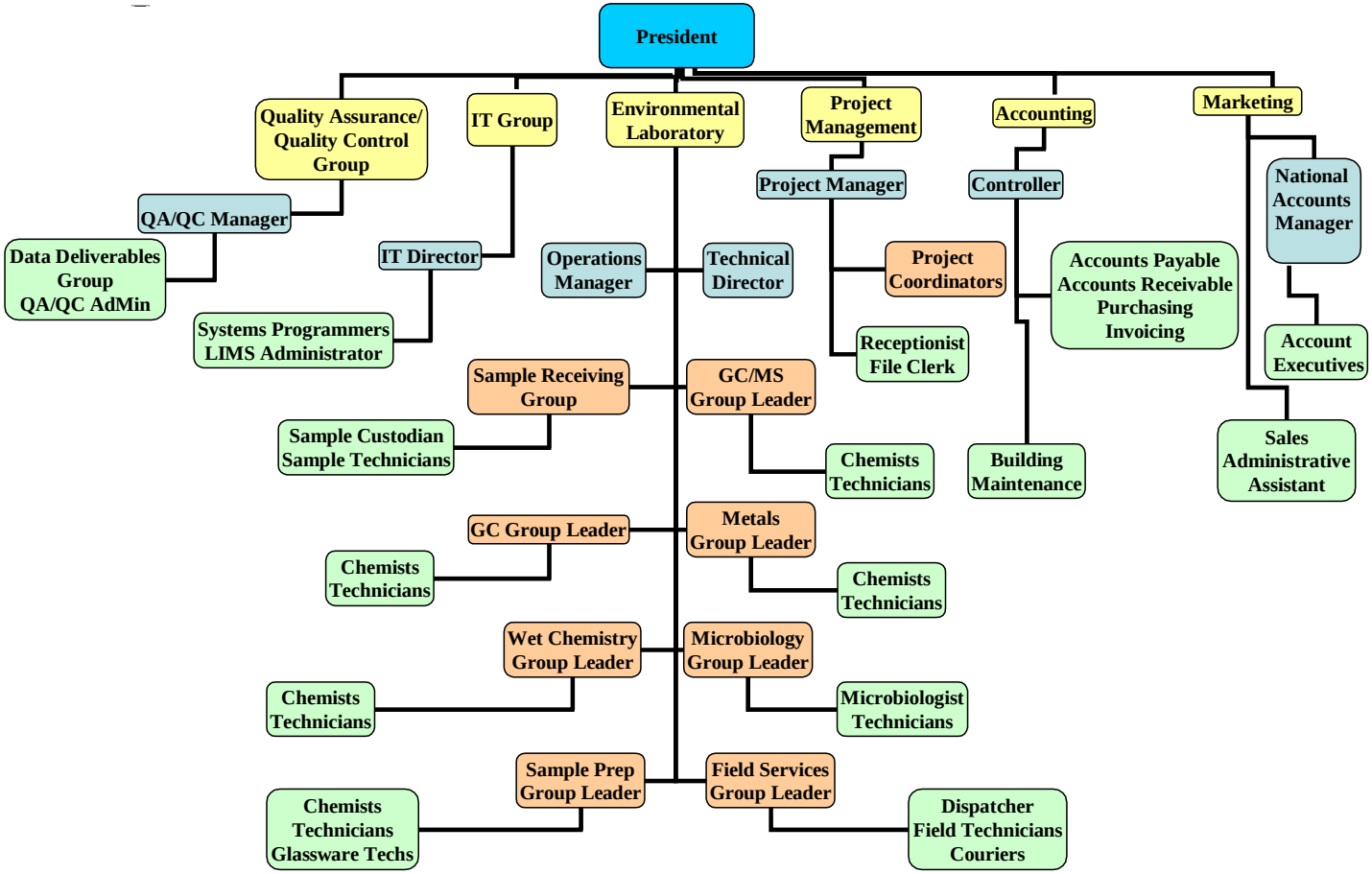
Analytical Laboratory Services, Inc.

Organizational Chart by Position



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Appendix B – Container, Preservation, Storage, and Holding Times

Description	Method	*Matrix PW-Potable Water NW-Nonpotable Water LW-Liquid Waste S-Soil, SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis Holding Time	Minimum Volume
METALS						
Total Recoverable / Dissolved Metals Digestion	3005A	NW, LW	P or G	HNO_3 pH<2	6 months	500mL
Total Metals Digestion by Microwave	3015	NW, LW	P or G	HNO_3 pH<2	6 months	500mL
Total Metals Digestion by Hot Plate	3020A	NW, LW	P or G	HNO_3 pH<2	6 months	500mL
AAS Metals (except CrVI or Hg)	200 series	PW, NW	P or G	HNO_3 pH<2	6 months	500mL
	200.9	PW	P or G	HNO_3 pH<2	6 months	500mL
	3000/7000 series	S, SW	P or G	Cool 4° C	6 months	100g
ICP Metals	200.7	PW, NW	P or G	HNO_3 pH<2	6 months	500mL
	3000 series/ 6010B	S, SW	P or G	Cool 4° C	6 months	100g
ICP/MS Metals	200.8	PW, NW	P or G	HNO_3 pH<2	6 months	500mL
	3000 series/ 6020	S, SW	P or G	Cool 4° C	6 months	100g
Chromium, Hexavalent (CrVI)	3500CrD	PW,NW	P or G	Cool 4° C	24 hours	500mL
Chromium, Hexavalent (CrVI)	3000/7196A	S, SW	P or G	Cool 4° C	30 days digestion/168 hrs after digestion for analysis	100g
Mercury (Hg)	245.1 /7470A	PW, NW	P or G	HNO_3 pH<2	28 days	500mL
	7471A	S, SW	P or G	Cool 4° C	28 days	100g
INORGANICS						
Acidity	2310B	PW, NW	P or G	Cool 4° C	14 days	200mL
Albuminoid Nitrogen	221	PW, NW	P or G	H_2SO_4 pH<2;Cool 4° C	28 days	500mL
Alkalinity	310.1/2320B	PW, NW	P or G	Cool 4° C	14 days	200mL
Alkalinity, Phenolphthalein	2320B	PW, NW	P or G	Cool 4° C	14 days	200mL
Ammonia (as N)	350.3	PW, NW	P or G	H_2SO_4 pH<2;Cool 4° C	28 days	500mL
	350.3	S, SW	P or G	Cool 4° C	28 days	100g

Do Not Print or Transfer

Description	Method	*Matrix PW-Potable Water NW-Nonpotable Water LW-Liquid Waste S-Soil, SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis Holding Time	Minimum Volume
Biochemical Oxygen Demand (BOD)	5210B	PW, NW	P or G	Cool 4° C	48 hours	1000mL
BOD, Carbonaceous	5210B	PW, NW	P or G	Cool 4° C	48 hours	1000mL
Bromate	300.1	PW, NW	P or G	50 mg/L EDA Cool 4° C	28 days	1000mL
Carbon Dioxide CO_2	4500-CO_2 Free 4500-CO_2 Total Result Determined by pH & Bicarbonate Calculation	PW, NW	N/A	N/A	14 days	N/A
Bromide	300.0	PW, NW	P or G	Cool 4° C	28 days	100mL
	9056.0	S, SW	P or G	Cool 4° C	28 days	25g
Chloride	300.0	PW, NW	P or G	Cool 4° C	28 days	100mL
	9056	S, SW	P or G	Cool 4° C	28 days	25g
Chlorine, Residual	4500G	PW, NW	P or G	Cool 4° C	Analyze immediately	200mL
Chemical Oxygen Demand	410.4	PW, NW	P or G	H_2SO_4 pH<2;Cool 4° C	28 days	50mL
Chlorite	300.1	PW,NW	P or G (opaque)	50 mg/L EDA; Cool 4° C	14 days	1000mL
Color	110.2/2120B	PW, NW	P or G	Cool 4° C	48 hours	1000mL
Corrosivity	Langlier Index Calculation	PW, NW	P or G	1 bottle HNO_3 pH<2; 1 bottle 4° C	NA	50mL (2)
	150.1/ 9040B	LW	P or G	Cool 4° C	Analyze immediately	100g or 8 oz. jar
	9045C	S, SW	P or G	Cool 4° C	Analyze immediately	100g or 8 oz. jar
Cyanide	335.3	NW	P or G	NaOH pH>12; Cool 4° C	Distillation & Analysis 14 days	500mL
	335.4	PW				
	9012	S, SW	P or G	Cool 4° C	14 days	100g
Cyanide, Amenable	335.3/335.4/4500CNG	PW	P or G	NaOH pH>12; Cool 4° C	Distillation & Analysis 14 days	500mL
	9012	S, SW	P or G	Cool 4° C	14 days	100g
Dissolved Organic Carbon	5310B	PW,NW	G, amber	HCl pH<2;Cool 4° C	28 days	125mL
Flash Point	1010	LW	G, Teflon-lined septum	Cool 4° C	NA	100mL

Do Not Print or Transfer

Description	Method	*Matrix PW-Potable Water NW-Nonpotable Water LW-Liquid Waste S-Soil, SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis Holding Time	Minimum Volume
Fluoride	4500F-C	PW, NW	P	None	28 days	100mL
	300.0	PW, NW	P	None	28 days	100mL
	9056.0	S, SW	P	None	28 days	25g
Hardness, Calcium	3500CaD	PW,NW	P or G	HNO_3 pH<2	6 months	500mL
Hardness, Magnesium	3500CaD	PW,NW	P or G	HNO_3 pH<2	6 months	500mL
Hardness, Total	2340B/200.7	PW, NW	P or G	HNO_3 pH<2	6 months	100mL
Landfill Gas	RSK175	NW	G	H_2SO_4 pH<2	14 days	40mL (2)
Nitrogen, Kjeldahl	351.3	PW, NW	P or G	H_2SO_4 pH<2;Cool 4° C	28 days	500mL
	351.3	S, SW	P or G	Cool 4° C	28 days	100g
Nitrate-Nitrogen	353.2 / 4500D	PW, NW	P or G	1 bottle H_2SO_4 pH<2 Cool 4° C (NO_3); 1 bottle Cool 4° C (NO_2)	NO_3 - 28 days NO_2 - 48 hours	100mL (2)
	300.0	PW, NW	P or G	None	48 hours	100mL
	9056	S, SW	P or G	Cool 4° C	48 hours	25g
Nitrate/Nitrite-Nitrogen	353.2	PW, NW	P or G	H_2SO_4 pH<2;Cool 4° C	28 days	100mL
Nitrite-Nitrogen	4500B	PW, NW	P or G	Cool 4° C	48 hours	100mL
	300.0	PW, NW	P or G	Cool 4° C	48 hours	100mL
	9056	S, SW	P or G	Cool 4° C	48 hours	25g
Nitrogen, Organic	Calculation	PW, NW	P or G	H_2SO_4 pH<2;Cool 4° C	28 days	1000mL
	Calculation	S, SW	P or G	Cool 4° C	28 days	100g
Odor	2150B / 140.1	PW	G	None	24 hours	1000mL
Oil and Grease	1664	PW, NW	G	H_2SO_4 pH<2;Cool 4° C	28 days	1000mL (3)
	9070	LW	G	HCl pH<2;Cool 4° C	28 days	1000mL
	9071B	S, SW	G	Cool 4° C	28 days	100g
Orthophosphate	365.3	NW	P or G	Cool 4° C	48 hours	100mL
	4500-PE	PW, NW	P or G	Cool 4° C	48 hours	100mL
Osmotic Pressure	Interim Method	PW, NW	P or G	Cool 4° C	48 hours	100mL
Oxygen, Dissolved	360.1	PW, NW	G Bottle and Top	None	Analyze immediately	500mL
Paint Filter Liquids Test	9095	LW, S, SW	P or G	None	NA	100g or 100mL

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Description	Method	*Matrix PW-Potable Water NW-Nonpotable Water LW-Liquid Waste S-Soil, SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis Holding Time	Minimum Volume
Perchlorate	314	PW,NW	P or G	None	28 days	100mL
pH	150.1	PW, NW	P or G	None	Analyze immediately	50mL
	9040B	LW	P or G	None	Analyze immediately	50mL
	9045C	S, SW	P or G	None	Analyze immediately	50g
Phenols	420.2	NW	G	H_2SO_4 pH<2;Cool 4° C	28 days	500mL
	420.4	NW				
	420.4	S, SW	G	Cool 4° C	28 days	100g
Phosphorus, Polyhydrolizable	365.1	PW, NW	P or G	H_2SO_4 pH<2;Cool 4° C	28 days	500mL
	365.1	S, SW	P or G	Cool 4° C	28 days	100g
Phosphorus, Soluble	365.1	PW, NW	P or G	H_2SO_4 pH<2;Cool 4° C	28 days	500mL
	365.1	S, SW	P or G	Cool 4° C	28 days	100g
Phosphorus, Total	365.1	PW, NW	P or G	H_2SO_4 pH<2;Cool 4° C	28 days	500mL
	365.1	S, SW	P or G	Cool 4° C	28 days	100g
Reactive Cyanide	SW846 Section 7.3.3.2	S, SW	P or G	Cool 4° C	14 days	100g or 8 oz. jar
Reactive Sulfide	SW846 Section 7.3.4.2	S, SW	P or G	Cool 4° C	7 days	100g or 8 oz. jar
Residue, Filterable (TDS)	160.1/2540C	PW, NW	P or G	Cool 4° C	7 days	250mL
Residue, Nonfilterable (TSS)	160.2	PW, NW	P or G	Cool 4° C	7 days	250mL
Residue, Settleable	160.5/2540F	PW, NW	P or G	Cool 4° C	48 hours	1000mL
Residue, Total	160.3/2540B	PW, NW	P or G	Cool 4° C	7 days	250mL
	160.3/2540G	S, SW	P or G	Cool 4° C	7 days	100g
Residue, Volatile	160.4/2540E	PW, NW	P or G	Cool 4° C	7 days	250mL
	160.4/2540E	S, SW	P or G	Cool 4° C	7 days	100g
Silica, Dissolved	370.1/4500SiD	PW, NW	P	Cool 4° C	28 days	100mL
Specific Conductance	120.1/2510B	PW, NW	P or G	Cool 4° C	28 days	100mL
Sulfate	300.0	PW, NW	P or G	Cool 4° C	28 days	250mL
Sulfide	376.1	PW, NW	G	Zn Acetate; NaOH pH>9; Cool 4° C	7 days	500mL
	9034	S, SW	G	Zn Acetate; NaOH pH>9; Cool 4° C	7 days	50g Sludge 25g Dry

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Description	Method	*Matrix PW-Potable Water NW-Nonpotable Water LW-Liquid Waste S-Soil, SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis Holding Time	Minimum Volume
Sulfite	377.1	PW, NW	P or G	EDTA; Cool 4° C	Analyze immediately	500mL
Surfactants (MBAS)	5540C	PW, NW	P or G	Cool 4° C	48 hours	2L
Temperature	170.1	PW, NW	P or G	None	Analyze immediately	100mL
THM Formation Potential	502.2	PW	G, Teflon-lined septum	Cool 4° C; $Na_2S_2O_3$ HCl pH<2	14days	40mL
Total Organic Carbon	415.1/5310C	PW, NW	G	HCl; pH<2;Cool 4° C	28 days	125mL
Total Organic Halogen	9020B	PW, NW	G, Teflon-lined septum	H_2SO_4 pH<2; Cool 4° C	14 days	250mL (2)
	9023Modified	S, SW	G, Teflon-lined septum	Cool 4° C	14 days	100g
Turbidity	SM2130B	PW, NW	P or G	Cool 4° C	24 hours	100mL
UV254	5910B	PW, NW	1L amber	Cool 4° C	48 Hours	1L
MICROBIOLOGY						
Fecal Coliform	9222D	NW	P or G Sterile	Cool 4° C; 0.008% $Na_2S_2O_3$	30 hours-DW 6 hours-WW 8 hours-GW	125mL
Iron Bacteria	In-House	NW	P or G Sterile	Cool 4° C; 0.008% $Na_2S_2O_3$	24 hours	125 mL
Total Coliform	9223B	PW, NW	P or G Sterile	Cool 4° C; 0.008% $Na_2S_2O_3$	30 hours	125mL
Standard Plate Count	9215 B	PW, NW	P or G Sterile	Cool 4° C; 0.008% $Na_2S_2O_3$	8 hours	125mL
Streptococci, Fecal	9230C	NW	P or G	Cool 4° C; 0.008% $Na_2S_2O_3$	As soon as possible after collection	125mL
ORGANICS						
Separatory Funnel Extraction	3510C	NW, LW	G, Teflon-lined cap	Cool 4° C (See determinative method for add'l preservation requirements)	7 days	1000mL (2)
Continuous Liquid/Liquid Extraction	3520C	NW, LW	G, Teflon-lined cap	Cool 4° C (See determinative method for add'l preservation requirements)	7 days	1000mL (2)

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Description	Method	*Matrix PW-Potable Water NW-Nonpotable Water LW-Liquid Waste S-Soil, SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis Holding Time	Minimum Volume
Automated Soxhlet Extraction	3545	S, SW	G, Teflon-lined cap	Cool 4° C	14 days	100g or 8 oz. jar
Ultrasonic Extraction	3550B	S, SW	G, Teflon-lined cap	Cool 4° C	14 days	100g or 8 oz. jar
Soxhlet Extraction	3540C	S, SW	G, Teflon-lined cap	Cool 4° C	14 days	100g or 8 oz. jar
Volatiles P&T Extraction	5030B	NW, LW	G, Teflon-lined septum	$NaHSO_4$; Cool 4° C; pH<2	14 days	40mL (3)
Volatiles Closed-System P&T Extraction	5035	S, SW	Encore™ Sampler	Cool 4° C	48 Hours	3-5g Encores for Low Level 1-5g Encores for Med Level
			Preweigh – Low Level 1g Sodium Bisulfate, 5 mL Reagent Water in a 40 mL VOA jar with stir bar	Cool 4° C after filled with sample	Analyze 14 days after filled with sample	Low Level 2-Low Level Containers 1-Medium Level Containers
			Preweigh-Med Level 5mL MEOH in 40mL VOA vial with stir bar			Med Level 1-Medium Level Containers
			G, Teflon-lined septum	Cool 4 ° C	Preserve using Preweighed Containers ASAP	4 oz. Jar
Alcohols and Acetates	8015 Modified	LW	G,Teflon-lined septum	4°C	14 days	40mL (2)
		SW	G,Teflon-lined septum	4°C	14 days	4 oz
Haloacetic Acids	552.2	PW	Amber Glass, Teflon-lined septum	Cool 4° C; Ammonium Chloride, 5 mg NH4Cl	14 days/14 days	40mL (2)
EDB/DBCP	504.1	PW	G, Teflon-lined septum	Cool 4° C; 3mg $Na_2S_2O_3$	14 days	40mL (2)
GC-Chlorinated Acids (Herbicides)	515.3	PW	G, Teflon-lined cap	Cool 4° C; 80mg $Na_2S_2O_3$	14 days/ 28 days	1000mL (2)
GC-Chlorinated Acids (Herbicides)	515.4	PW	G, Teflon-lined cap	Cool 4° C; 80mg $Na_2S_2O_3$	14 days/ 28 days	1000mL (2)
GC/MS-Solid Phase Extraction	525.2	PW	Amber Glass Teflon-lined cap	Cool 4° C; add 80mg $Na_2S_2O_3$ per liter If + for residual Cl ; pH <2 HCl	14days/30 days	1000mL (2)
GC/MS-Endothall by Solid Phase Ion Exchange	548.1	PW	G, Teflon-lined cap	Cool 4° C; 80mg $Na_2S_2O_3$	7 days/14 days	250mL (2)

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Description	Method	*Matrix PW-Potable Water NW-Nonpotable Water LW-Liquid Waste S-Soil, SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis Holding Time	Minimum Volume
HPLC-Glyphosate	547	PW	G, Teflon-lined cap	Cool 4° C; 80mg $Na_2S_2O_3$	14days	40mL (2)
GC-Herbicides	8151A	NW, LW	G, Teflon-lined cap	Cool 4° C	7 days/40 days	1000mL (2)
	8151A	S, SW	4 oz Plastic Jar	Cool 4° C	14 days/28 days	30g
GC-Organic Acids	In-house	NW	P or G zero headspace	None	28 days	250mL
GC-PCB Screening	508A	PW	G, Teflon-lined cap	Cool 4° C	14 days/30 days	1000mL (2)
GC-Pesticides	505	PW	G, Teflon-lined septum	Cool 4° C; 3mg $Na_2S_2O_3$	If Heptachlor is present 7 days, if not 14 days	40 mL (2)
GC-Pesticides	608 /8000 series/8081A	NW, LW	G, Teflon-lined cap	Cool 4° C; 5<pH<9	7 days/40 days	1000mL (2)
	8000 series/8081A	S, SW	G, Teflon-lined cap	Cool 4° C	14 days/40 days	100g or 8 oz. jar
GC-Pesticides	622	NW	1L Amber	Cool 4° C	7 days/40 days	1L
GC-PCBs	608 / 8000 series/8082	NW, LW	G, Teflon-lined cap	Cool 4° C; 5<pH<9	7 days/40 days	1000mL (2)
	8000 series/8082	S, SW	G, Teflon-lined cap	Cool 4° C	14 days/40 days	100g or 8 oz. jar
HPLC, PAHs	8000 Series/ 8310	NW, LW	G, Teflon-lined cap	Cool 4° C	7 days/40 days	1000mL (2)

Do Not Print or Transfer

Description	Method	*Matrix PW-Potable Water NW-Nonpotable Water LW-Liquid Waste S-Soil, SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis Holding Time	Minimum Volume
	8000 Series/8310	S, SW	G, Teflon-lined cap	Cool 4° C	14 days/40 days	100g or 8 oz. jar
HPLC-Nitroaromatics and Nitramines (Explosives)	8000 Series/8330	NW, LW	G, Teflon-lined cap	Cool 4° C	7 days/40 days	1000mL (2)
	8000 Series/8330	S, SW	G, Teflon-lined cap	Cool 4° C	14 days/40 days	100g or 8 oz. jar
GC, Nitrogen Phosphorus Pesticides	8000 Series/8141A	NW	G, Teflon-lined cap	Cool 4° C 5<pH<8	7 days/40 days	1000mL (2)
	8000 Series/8141A	S, SW	G, Teflon-lined cap	Cool 4° C 5<pH<8	14 days/40 days	100g or 8 oz. jar
GC-Pesticides/PCBs, Chlorinated	508	PW	G, Teflon-lined cap	Cool 4° C; 80mg/L $Na_2S_2O_3$	7 days/14 days	1000mL (2)
GC-Pesticides, Nitrogen Phosphorus	507	PW	G, Teflon-lined septum	Cool 4° C; 80mg/L $Na_2S_2O_3$	14 days/14 days	1000mL (2)
Diquat and Paraquat	549.2	PW	PVC high-density	Cool 4° C; 80mg/L $Na_2S_2O_3$	7 days/21days	1000mL
GC-Purgeable Aromatics	602/8021B	NW	G, Teflon-lined septum	$Na_2S_2O_3$; HCl pH<2;Cool 4° C	14 days	40mL (2)
	8021B	S, SW	See Method 5035	Cool 4° C	14 days	See Method 5035
	601	NW	G, Teflon-lined septum	$Na_2S_2O_3$; Cool 4° C	14 days	40mL (2)
GC-Purgeable Organics	502.2	PW	G, Teflon-lined septum	3mg/40mL $Na_2S_2O_3$; Cool 4° C; HCl pH<2	14 days	40mL (2)
	601/602 modified	NW	G, Teflon-lined septum	$Na_2S_2O_3$;HCl pH<2;Cool 4° C	14 days	40mL (2)
GC-Purgeable Organics	8021B	NW	G, Teflon-lined septum	$Na_2S_2O_3$;HCl pH<2;Cool 4° C	14 days	40mL (2)
		S, SW	G, Teflon-lined septum	Cool 4° C	14 days	100g or 8 oz. Jar

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Description	Method	*Matrix PW-Potable Water NW-Nonpotable Water LW-Liquid Waste S-Soil, SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis Holding Time	Minimum Volume
GC/MS-Purgeable Organics	524.2	PW	G, Teflon-lined septum	Cool 4° C;HCl pH<2; 25 mg Ascorbic Acid	14 days	40mL (2)
	624/ 8260B	NW	G, Teflon-lined septum	$Na_2S_2O_3$;HCl pH<2;Cool 4° C	14 days	40mL (2)
	8260B	S, SW	See Method 5035	Cool 4° C	14 days	See Method 5035
GC/MS-Semivolatiles	625/ 8000 series/8270C	NW	G, Teflon-lined septum	$Na_2S_2O_3$;Cool 4° C	7/40 days	1000mL (2)
	8000 series/ 8270C	S, SW	G, Teflon-lined septum	Cool 4° C	14/40 days	100g or 8 oz. jar
HPLC-Carbamates	531.1	PW	G, Teflon-lined cap	Mono-chloroacetic Acid to pH 3; 80 mg/L $Na_2S_2O_3$ Cool 4° C	28 days	40mL (2)
TOTAL PETROLEUM HYDROCARBONS						
Dissolved Gases	RSK-175	W	G, Teflon-lined septum	HCl	14 days	40 mL (2)
Total Petroleum Hydrocarbons (TPH)	1664	NW	G	Cool 4° C; pH<2, H2SO4	28 days	1000mL (2)
Total Petroleum Hydrocarbons (TPH)	418.1	PW, NW	G	Cool 4° C; pH<2, H2SO4	28 days	1000mL (2)
Total Petroleum Hydrocarbons (TPH)	418.1 modified	S, SW	G	Cool 4° C	28 days	100g or 8 oz. jar
Total Petroleum Hydrocarbons as Diesel	8000 series/ 8015B	PW, NW	G	Cool 4° C; pH<2, H2SO4	14 days/40 days	1000mL (2)
	8000 series/ 8015B	S, SW	G	Cool 4° C	14 days/40 days	100g or 8 oz. jar
Gasoline Range Organics	8000 series/8015B	PW, NW	G, Teflon-lined septum	Cool 4° C, pH<2 HCl	14 days	40mL (2)
Gasoline Range Organics	8000 series/8015B	S, SW	See Method 5035	Cool 4° C	14 days	See Method 5035
LEACHING PROCEDURES						
EP Toxicity Metals	1310A	LW	P or G	Cool 4° C	28 days to leaching	1000mL
	1310A	S, SW	P or G	Cool 4° C	28 days to leaching	100g
TCLP Metals Only	1311	LW	P or G	Cool 4° C	28 days to leaching	1000mL

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Description	Method	*Matrix PW-Potable Water NW-Nonpotable Water LW-Liquid Waste S-Soil, SW-Solid Waste	Sample Container	Preservation	Prep/ Analysis Holding Time	Minimum Volume
Continued TCLP Metals Only		SW	P or G	Cool 4° C	28 days to leaching	500g
GC/MS-TCLP Volatile Organics continued GC/MS-TCLP Volatile Organics	1311	LW	G, Teflon-lined septum	Cool 4° C	14 days to leaching	200mL
		SW	G, Teflon-lined septum	Cool 4° C	14 days to leaching	100g
GC/MS-TCLP Semivolatiles	1311	LW	G, Teflon-lined cap	Cool 4° C	14 days to leaching	3000mL
		SW	G, Teflon-lined cap	Cool 4° C	14 days to leaching	500g
SPLP Metals Only	1312	LW	P or G	Cool 4° C	28 days to leaching	1000mL
SPLP Metals Only	1312	SW	P or G	Cool 4° C	28 days to leaching	500g
GC/MS-SPLP Volatile Organics	1312	LW	G, Teflon-lined septum	Cool 4° C	14 days to leaching	200mL
GC/MS-SPLP Volatile Organics	1312	SW	G, Teflon-lined septum	Cool 4° C	14 days to leaching	100g
GC/MS-SPLP Semivolatiles	1312	LW	G, Teflon-lined cap	Cool 4° C	14 days to leaching	3000mL
		SW	G, Teflon-lined cap	Cool 4° C	14 days to leaching	500g
Air Procedures						
Methane, Ethane, Ethene	RSK – 175	Air	VOA Vials with no Headspace	Non-preserved	14 days	400 uL of air
Polyaromatic Hydrocarbons	TO-13	Air	XAD Sorbent Cartridges (PUF Cartridges)	Cool 4° C	7 days/40	Sample volume at client's discretion
Volatile Organics	TO-15	Air	Summa Canisters	----------	30 days	Sample volume at client's discretion

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Appendix C – Chain Of Custody Record

Analytical Laboratory Services, Inc.
Environmental • Industrial Hygiene • Field Services
34 Dogwood Lane • Middletown, PA 17057 • 717.944.5541 • Fax: 717.944.1430

CHAIN OF CUSTODY/ REQUEST FOR ANALYSIS

ALL SHADED AREAS MUST BE COMPLETED BY THE CLIENT / SAMPLER. INSTRUCTIONS ON THE BACK.

COC #: _____ of _____
ALSI Quote #:

Client Name:
Address:
Contact:
Phone#:
Project Name/#:
Bill To:
TAT: ☐ Normal-Standard TAT is 10-12 business days. ☐ Rush-Subject to ALSI approval and surcharges.
Date Required: _____ Approved By: _____
Email? ☐ -Y
Fax? ☐ -Y No.:

***Container Type
***Container Size
*** Preservative

ANALYSES/METHOD REQUESTED

Sample Description/Location (as it will appear on the lab report)	Sample Date	Military Time	*G or C	**Matrix	Enter Number of Containers Per Analysis Requested or Field Results Below.	Sample/COC Comments
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Receipt Information (completed by Receiving Lab)
Cooler Temp: _____ Therm. ID: _____
No. of Coolers: _____

	Y	N	Initial
Custody Seals Present?			
(if present) Seals Intact?			
Received on Ice?			
COC/Labels Complete/Accurate?			
Cont. in Good Cond.?			
Correct Containers?			
Correct Sample Volumes?			
Correct Preservation?			
Headspace/Volatiles?			

Courier/Tracking #:

SAMPLED BY (Please Print):
LOGGED BY(signature): DATE: TIME:
REVIEWED BY(signature): DATE: TIME:

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 SAMPLED BY			2		
3			4		
5			6		
7			8		
9			10		

Data Deliverables: ☐ Standard ☐ CLP-like ☐ NJ-Reduced ☐ NJ-Full ☐ (other)

EDDs Required? ☐ If yes, format type:

DOD Criteria Required?

State Samples Collected In		SDWA Forms Required?	
NC		yes	
NJ		yes	
NY		yes	
PA		yes	
Other			
PWSID			

ALSI Field Services: ☐ Pickup ☐ Labor ☐ Composite Sampling ☐ Rental Equipment ☐ Other:

* G=Grab; C=Composite **Matrix: AI=Air; DW=Drinking Water; GW=Groundwater; OI=Oil; OL=Other Liquid; SL=Sludge; SO=Soil; WP=Wipe; WW=Wastewater

Copies: WHITE - ORIGINAL CANARY - CUSTOMER COPY ***Container Type: AG-Amber Glass; CG-Clear Glass, PL-Plastic. Container Size: 250ml, 500ml, 1L, 8oz., etc. Preservative: HCl, HNO3, NaOH, etc. Rev 5/06

Do Not Print or Transfer
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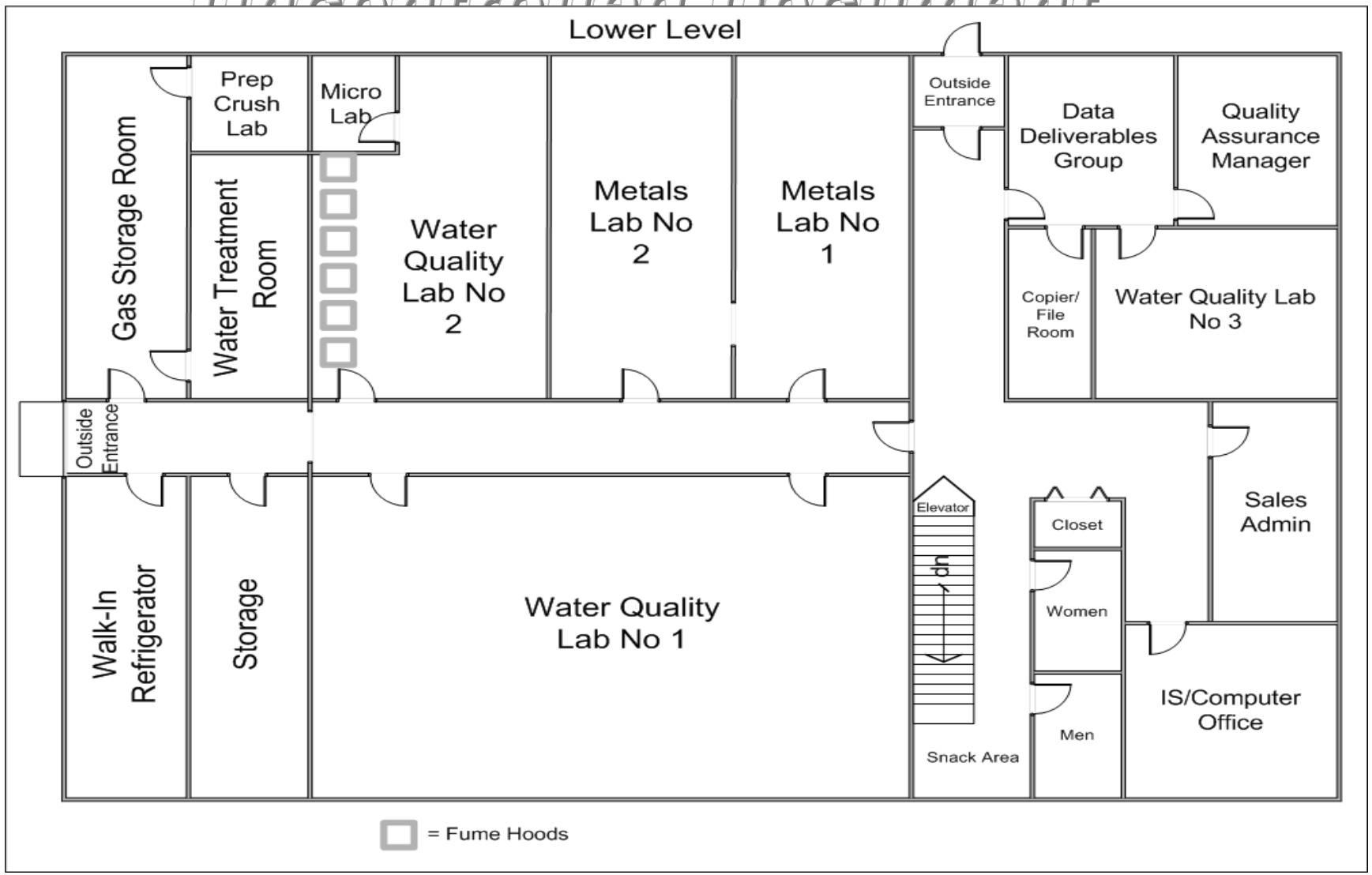
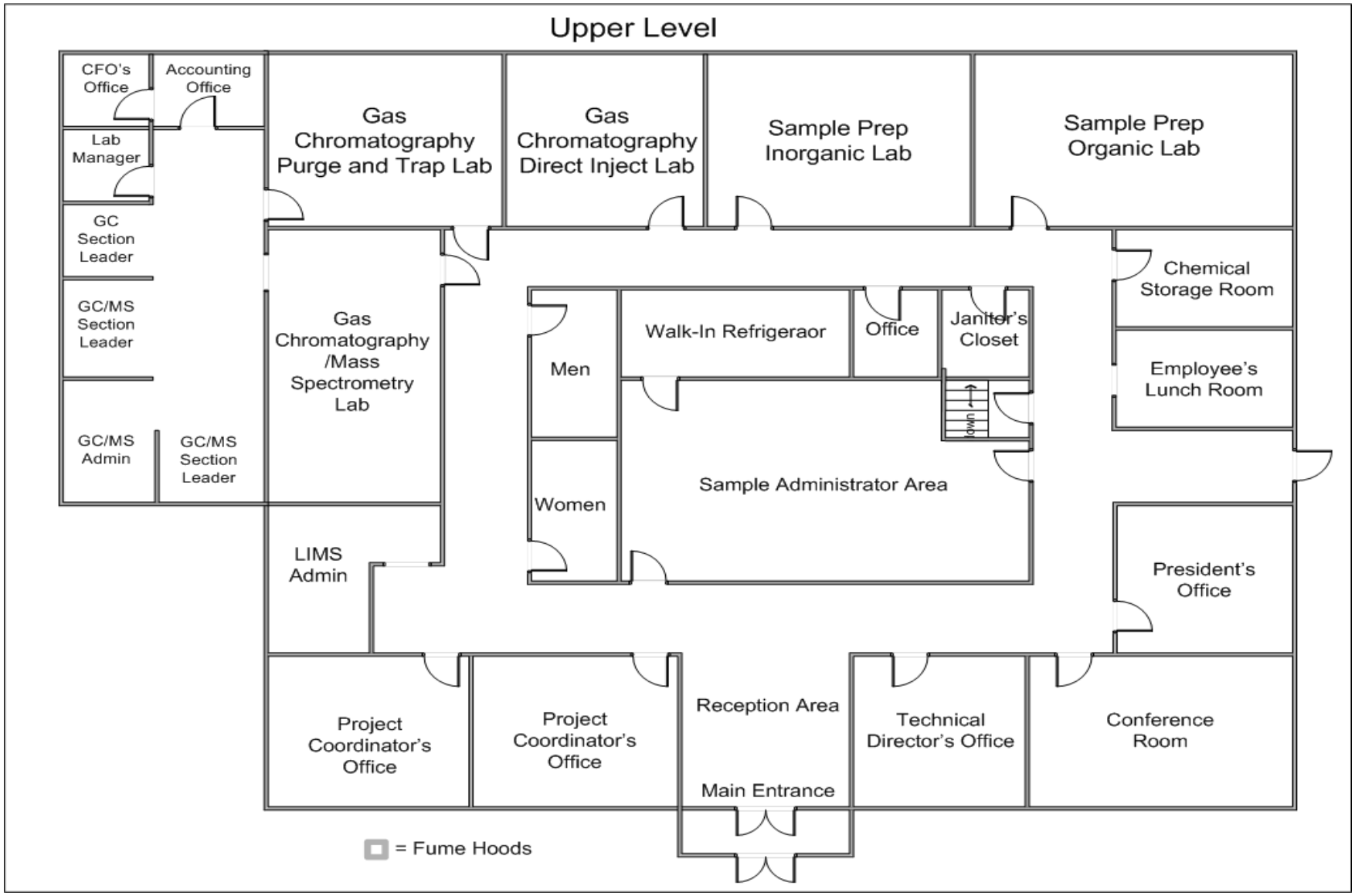
Appendix D – Laboratory Floor Plans



Do Not Print or Transfer



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Appendix E – Instrument List

ANALYTICAL INSTRUMENTATION LIST

Instrument	Manufacturer	Model No.	Analysis	Serial No.	Acquisition Date and Condition When Received	Date in Service
ORGANICS EXTRACTION						
AccuPrep GPC Cleanup System	J2 Scientific	Series I Pump	organics GPC cleanup	A12598	2005: new	2006
	J2 Scientific	Auto-Injector	organics GPC cleanup	04L-1137-3.2	2005: new	2006
	J2 Scientific	Auto-Sampler	organics GPC cleanup	4451 A2960	2005: new	2006
	J2 Scientific	UV Detector	organics GPC cleanup	DS00005382	2005: new	2006
Dual Horn Sonicator	Sonics & Materials Corp	VC-750	organics extraction	49252N	2005: new	2005
Dual Horn Sonicator	Sonics & Materials Corp	VC-750	organics extraction	39145H	2004: new	2004
ASE 200 Extractor	Dionex Corp.	ASE 200	organics extraction	98090228	1998: new	1998
Infrared Spectrophotometer	Buck Scientific	HC-404	TPH	634	1996: new	1996
GAS CHROMATOGRAPHY/MASS SPECTROMETRY						
Purge and Trap Concentrator with Autosampler and Sample Heater (MS01)	Tekmar/EST	2000/Archon EST	GC/MS-VOA	3518A10324/13449	1999: used	1999
Gas Chromatograph/Mass Selective Detector (MS01) (with EI, packed or capillary columns, and autoinjector)	Hewlett Packard	5890/5970	GC/MS-VOA	2950A26771/3004A12574	1986: new	1986
Gas Chromatograph/Mass Selective Detector (MS02) with Autosampler and Injector	Hewlett Packard	5890/5971	GC/MS-BNA	3033A31928/N.A.	2001: used	2001
Gas Chromatograph/Mass Selective Detector (MS03) with Purge and Trap Concentrator/Autoinjector	Hewlett Packard	5890/5972	GC/MS-VOA	3336A59812/3501A02569	1995: new	1995
Purge and Trap Concentrator with Autosampler and Sample Heater (MS03)	Tekmar/EST	3000/Archon EST	GC/MS-VOA	93133003/13137	1986: new	1986
Gas Chromatograph/Mass Selective Detector (MS04) with Autosampler and Injector	Hewlett Packard	5890/5972	GC/MS-BNA	US00662866/3549A03337	1997: new	1997
Gas Chromatograph/Mass Selective Detector (MS05) (with EI and capillary column) with Autoinjector	Hewlett Packard	5890/5971	GC/MS-VOA	3140A38964/3022A01159	2001: used	2001
Purge and Trap Concentrator with Autosampler and Sample Heater (MS05)	Tekmar/EST	3000/Archon EST	GC/MS-VOA	90169022/13679	1990: used	1990
Gas Chromatograph/Mass Selective Detector (MS07) (with EI and capillary column) with Autoinjector	Hewlett Packard	5890/5971	GC/MS-VOA	3133A37488/3118A02504	1992: used	1992
Purge and Trap Concentrator with Autosampler and Sample Heater (MS07)	Tekmar/EST	2000/Archon EST	GC/MS-VOA	90163013/12543	1999: used	1999
Gas Chromatograph/Mass Selective Detector (MS08) with Autosampler and Injector	Agilent	5972/5890E 7673A/18593B	GC/MS-BNA	MS: 2W3723RR/GC: 3336A60351 AS: 2718A06188/IN: 3524A42956	2005: used	2005
Gas Chromatograph/Mass Selective Detector (MS09)	Hewlett Packard	6890/5973	GC/MS-BNA (DW)	US00027847/US92522731	2000: new	2000
Gas Chromatograph/Mass Selective Detector (MS11)	Finnigan	Trace CC/Trace DSQ	GC/MS-VOA	20033754/100084	2003: new	2003
Purge and Trap Concentrator with Autosampler and Sample Heater (MS11)	Tekmar/EST	Velocity XPT/ Archon EST	GC/MS-VOA	US03150011/13918	2003: new	2003
Gas Chromatograph/DSQ Mass Selective Detector (MS13) with Entech Preconcentrator/Autosampler	Finnigan	100200/ 7100A/7016CA	GC/MS-VOA IN AIR	20042638/ 1134	2005: new	2005

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ANALYTICAL INSTRUMENTATION LIST

Instrument	Manufacturer	Model No.	Analysis	Serial No.	Acquisition Date and Condition When Received	Date in Service
GAS CHROMATOGRAPHY						
Dynatech Archon	Dynatech	5100	GC	11767-695	1995: NA	1995
Gas Chromatograph (with TCD) (GC-1)	GOW-MAC	550	GC-Organic Acids	E63605	1991: NA	1991
Gas Chromatograph (with PID/ELCD) (GC-2)	Hewlett Packard	6890	GC-VOA	US00021496	1999: new	1999
Gas Chromatograph (with dual ECD) (GC-4)	Hewlett Packard	5890	GC-PCBs/504.1	3310A49263	1997: new	1997
Gas Chromatograph (with ECD) (GC-5)	Hewlett Packard	5890	GC-Herbicides/504/Pest/PCBs	3140A47535	1997: new	1997
Gas Chromatograph (GC-7)	Hewlett Packard	5890	GC-Capillary Column	3234A00311	1997: new	1997
Gas Chromatograph (with PID/FID) (GC-8)	Hewlett Packard	5890II	GC-BTEX/GRO	3203A40203	1994: new	1994
Gas Chromatograph (with ECD/ELD) (GC-9)	Hewlett Packard	5890II	GC-Herbicides/Pest/PCBs/507	2950A27674	2004: used	2004
Gas Chromatograph (with ECD/NPD) (GC-10)	Hewlett Packard	5890/7673	GC-Pesticides/PCBs/Herbicides	3223A42304	1992: new	1992
Gas Chromatographs (with FID/FID) (GC-11)	Hewlett Packard	5890	GC-TPH/DRO	2541A08247	1990: new	1990
Gas Chromatograph (with PID/ELCD) (GC-12)	Hewlett Packard	5890II	GC-VOA	3235A44488	1994: NA	1994
Gas Chromatograph (NPD/NPD) (GC-13)	Hewlett Packard	5890	GC	2415801131	2003: used	2003
Gas Chromatographs (with ECD/ECD) (2) (GC-14)	Hewlett Packard	5890	GC-Pesticides/PCBs	3235A44019	1995: new	1995
Gas Chromatograph Data System	PE Nelson	Turbochrom 4.1	GC	95074101484/95074101485	1995: new	1995
Purge and Trap Concentrators (4) with Autosampler and Sample Heater	Tekmar	LSC2000/ALS2016	GC	9203001/9216008 90296013/90302015 92014003	1992: NA 1990	1990
Purge and Trap Concentrators (4) with Autosampler	Tekmar	LSC2/ALS	GC	87042001/307 87042002/1205	1987: NA 1987	1987
Purge and Trap Concentrator	Tekmar	LSC2	GC	88197004	1988: NA	1988
Gas Chromatograph (with FID)	Tracor	540	GC-Screen - Packed Column	851286	1989: NA	1989
Gas Chromatograph (with PID/ELCD/FID)	Waters	Dimension I	GC-BTEX/GRO	Not appplicable	1997: NA	1997
HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC)						
Fluorescence Detector	Jasco	FP2020Plus	HPLC	B078260869	2005: new	2005
Temperature Controller	Waters	Not appplicable	HPLC	TCM-007278	**: NA	NA
Column Oven	Waters	Not appplicable	HPLC	CHM-005183	**: NA	NA
Post Column Reactor	ASI	310	HPLC	310-0501	2004: new	2004
Series II Pump 1	Lab Alliance	Series II	HPLC	A12537	2004: new	2004
Series II Pump2	Lab Alliance	Series II	HPLC	A12538	2004: new	2004
715 Autosampler	Waters	715	HPLC	717-001526	**: NA	NA
600E Controller	Waters	600E	HPLC	GPLEPH791	*: NA	NA
600E Pump	Waters	600E	HPLC	CAS-PF4812	*: NA	NA
600E Controller	Waters	600E	HPLC	6PLEPG744	2005: used	2005
600E Pump	Waters	600E	HPLC	NA	*: NA	NA
Fluorescence Detector	Waters	470	HPLC	470-000551	*: NA	NA
Column Oven	Waters	Not appplicable	HPLC	CHM-0117240	*: NA	NA
715 Autosampler	Waters	715	HPLC	715-001328R	*: NA	NA
486 Tunable UV Detector	Waters	486	HPLC	486-PRD499	*: NA	NA

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ANALYTICAL INSTRUMENTATION LIST

Instrument	Manufacturer	Model No.	Analysis	Serial No.	Acquisition Date and Condition When Received	Date in Service
METALS						
Autosampler	Varian		GF Metals	0061369	1990: used	1990
Inductively Coupled Plasma-Mass Spectroscopy	Perkin Elmer	ELAN 6000	ICP-MS Metals	182960360	2001: used	2001
Inductively Coupled Plasma-Mass Spectroscopy	Perkin Elmer	ELAN DRCE	ICP-MS Metals	W0290306H	2005: used	2005
Graphite Furnace Zeeman Background	Varian	400Z	GF Metals	0061071	1990: used	1990
Inductively Coupled Plasma, IRIS Advantage Dual-View	Thermo-Jarrell Ash	IRIS	ICP Metals	Not appplicable	2000: used	2001
with 300-Place Autosampler	Thermo-Jarrell Ash	300	ICP Metals	Not appplicable	2000: new	2000
Mercury Analyzer	PSA	10.45	Mercury	007	2002: used	2002
Mercury Analyzer	CETAC	M6100	Mercury	030501QT6	2005: new	2005
Microwave Digestion System	CEM Corporation	MDS-2100	Metals Digestion	ZR8053	2001: used	2001
Inductively Coupled Plasma, Simultaneous	Thermo-Jarrell Ash	61E	ICP Metals	278490	1994: new	1994
Hot Water Bath	Precision Scientific	180 Series	Wet Chem/Hg Digestion	Not appplicable	2003: new	2003
CPI Mod-Block (Hot Block)	CPI	Not appplicable	Metals Digestion	Not appplicable	1999: new	1999
CPI Mod-Block (Hot Block)	CPI	Not appplicable	Metals Digestion	Not appplicable	2005: new	2005
WET CHEMISTRY						
AA3 Autoanalyzer	Bran-Luebbe	AA3	Wet Chem	54449525/9528237	2002: new	2002
Autoclave	Market Forge	Sterilmatic	Wet Chem	GM2304	1993: new	1993
Balance	Mettler	AE100	Wet Chem	B94827	1986: new	1986
Balance	Mettler	PM4800	Wet Chem	1113242887	1994: new	1994
Centrifuge	Becton Dickinson	Dynac 420101	Wet Chem	2850029	1994: new	1994
COD Digestor	HACH	45600	COD	920700007511	1995: new	1995
COD Digestor	HACH	45600	COD	920600007361	1994: new	1994
COD Digestor	HACH	16500	COD	880811313	1988: new	1988
Colony Counter	Biotech	Biotech	Microbiology	Not appplicable	1986: new	1986
Conductivity Meter	Orion	160	Wet Chem	53076047	1995: new	1995
Digestor	Tecator	1015	Wet Chem	Not appplicable	1995: new	1995
Digestor	LabConco	25Place	Wet Chem	010695394E	2001: new	2001
Distillation Unit	Buchi	323	Ammonia-Nitrogen	Not appplicable	1993: new	1993
Incubators (2)	VWR	2020, 2030	Wet Chem	0900290	1992: new	1992
Incubator	American Scientific	IS-61	Microbiology	Not appplicable	1986: new	1986
Incubator Bath	Precision Scientific	251	Microbiology	Not appplicable	1986: new	1996
Ion Chromatographer with:	Dionex	DX-500	300.0/300.1/314.0	Not appplicable	2004: new	2004
Autosampler	Dionex	AS40	300.0/300.1/314.0	98100646	1999: new	1999
Computer	Dell	D1028L	300.0/300.1/314.0	84779-A1VJY	1999: new	1999
Ion Chromatographer with:	Dionex	DX-120	300.0/300.1/314.0	00110303	2000: new	2000
Autosampler	Dionex	AS40	300.0/300.1/314.0	00100638	2000: new	2000
Ion Analyzer	Orion	EA940	Wet Chem	Not appplicable	1995: new	1995
Ion Analyzer	Orion	EA920	Wet Chem	Not appplicable	1996: new	1996

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ANALYTICAL INSTRUMENTATION LIST

Instrument	Manufacturer	Model No.	Analysis	Serial No.	Acquisition Date and Condition When Received	Date in Service
Lachat QuickChem with XYZ Autosampler and Autodiluter	Lachat		Anions	2000-600/2000-479/2000-350	1993: new	1993
Lachat QuickChem with XYZ Autosampler and Autodiluter	Lachat		Anions	2000-0150/279MO-B160	2005: used	2005
Microscope	Olympus	BHT2	Asbestos	022785/229024	1988: new	1988
Muffle Furnace	Vulcan	3-1750	Wet Chem	Not appplicable	1996: new	1996
Osmometer	Advanced Instruments	3W2	Wet Chem	38948	1990: new	1990
Oven	Lab-Line	Imperial V	Wet Chem	Not appplicable	1988: new	1988
Oven	Lab-Line	Imperial IV	Wet Chem	Not appplicable	1988: new	1988
Closed Cup Flash Point Apparatus	Koehler	K16200	Wet Chem	R61091664	1991: new	1991
Closed Cup Flash Point Apparatus	Koehler	K16200	Wet Chem	R02791251	1994: used	2004
pH Meters (3)	Corning	350	Wet Chem	1868	1988: new	1988
pH Meter	Fisher	825	Wet Chem	495	1995: new	1995
Quanti-Tray Sealers (2)	IDEXX	2020	Microbiology	Not appplicable	1996: new	1996
Rapidstill (2)	Labconco	Rapidstill II	Wet Chem	Not appplicable	1996: new	1996
Ultrasonic Cleaner	Branson	2200	Wet Chem	Not appplicable	1988: new	1988
Ultrasonic Cleaner	Branson	2210	Wet Chem	Not appplicable	1994: new	1994
SmartChem	Westco		Wet Chem		2002: new	2002
Specific Conductance Meter	YSI		Wet Chem	1552	1990: new	1990
Spectrophotometer	HACH	DR2000	COD	930500024601	1994: new	1994
TOC Autosampler	Dohrman	ASM-1	TOC	HD1680	1988: new	1988
TOC Autosampler	Shimadzu	ASI5000A	TOC	Not appplicable	1996: new	1996
Total Organic Carbon Analyzer	Shimadzu	5000A	TOC	Not appplicable	1996: new	1996
Total Organic Carbon Analyzer	Dohrman	DX-20A	TOC	HF1667	1986: new	1986
Total Organic Carbon Analyzer	Shimadzu	SSM-5000A	TOC	40440748	2003: new	2003
Total Organic Halogen Analyzer	Mitsubishi	TOX-10	TOX	43C32231	1991: new	1991
Total Organic Halogen Analyzer	Mitsubishi	TOX-10E	TOX	75R03775	1991: new	1991
Turbidimeter	HF Scientific	DRT 100B	Wet Chem	18485	1994: new	1994
UV Spectrophotometer	Milton Roy	501	Wet Chem	Not appplicable	1998: new	1998
UV/Visible Spectrophotometer	Shimadzu	UV-1201	Wet Chem	30034J	1997: new	1997

N.A.-- Information Not Available
** - listed as 1991 manufacture, acquisition date, condition and date of implementation not known*
*** - acquisition date, condition and date of implementation unknown*

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Appendix F – Change History Form

Section No	Section	Reason for Change
7.6	Data Deliverable Packages	PADEP Audit 2004 Corrective Action
7.7	Quality Assurance Documents, Item 2,6,9	PADEP Audit 2004 Corrective Action
7.8	External Documents	PADEP Audit 2004 Corrective Action
8.1	Reagents	Change of LIMS System (Element to Horizon)
8.2	Reference Standards	Change of LIMS System (Element to Horizon)
8.5	Balances	Class S weights changed to Class 1
10.1	Laboratory Capacity Review	PADEP Audit 2004 Corrective Action
14.3.1	Test Scheduling	Change of LIMS System (Element to Horizon)
14.3.2	Record of Analysis	Change of LIMS System (Element to Horizon)
14.3.3	Preps Performed Entry	Change of LIMS System (Element to Horizon)
14.3.4	Reporting Results	Change of LIMS System (Element to Horizon)
15.1.2	Bottle Preservation (paragraph 3)	Change of LIMS System (Element to Horizon)
15.1.3	Holding Time	Change of LIMS System (Element to Horizon)
15.1.4	Turnaround Time	Change of LIMS System (Element to Horizon)
15.2.1	Chain of Custody Form (paragraph 2)	Change of LIMS System (Element to Horizon)
15.2.4	Sample Identification and Control	Change of LIMS System (Element to Horizon)
17.4	Quality Control Charts	Change of LIMS System (Element to Horizon)
17.6	Data Reduction, Validation and Reporting	Change of LIMS System (Element to Horizon)
17.7	Data Deliverable Reporting	PADEP Audit 2004 Corrective Action
22.2	Internal Audits	PADEP Audit 2004 Corrective Action

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Appendix F – Change History Form (continued)

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Section No for Rev 17; 07/25/2006	Section	Reason for Change
NA	Throughout Document	Replaced "Client" with "Customer" to conform to current practices
NA	Throughout Document	Revised job titles and job descriptions to conform to current practices and DoD requirements
4	Quality Policy and Objectives	Additions made to address importance of Quality System achievements
7	Document Control	Updated practices/procedures
8	Traceability of Measurement	A2LA Traceability Policy of 01/2006
8.5	Vendor Approval	Updated practices/procedures
12	Customer Services	Updated practices/procedures
13	Control of Nonconformance Testing	DoD 2005 Audit observation
14	Test Method Reference	Updated practices/procedures
15.1.2	Bottle Preservation	Updated practices/procedures
15.2	Sample Custody	Updated practices/procedures
16	Laboratory Facilities and Equipment	Updated practices/procedures and added additional detail
17.2.4	Trip Blank	Updated practices/procedures
17.2.11 – 17.2.13	MDL, RDL, Common Laboratory Contaminants	Added to Definition List
17.5	Method Detection Limits	DoD Requirements
17.7	Data Deliverable Reporting	Updated practices/procedures
18	Corrective Actions and Feedback	DoD 2005 Audit Observation
18.1	Preventative Action	Updated practices/procedures
22	Audit and Review	Updated practices/procedures
NA	Appendices/Figures	Updated practices/procedures and forms

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Figure 1 – Reagent Logbook

CHEMICAL NO.	CHEMICAL NAME	MFGR.	LOT NO.	DATE RECVD	*DATE EXPIRED	RCVR'S INITIALS	P.O. NO.	STORAGE LOCATION	NO. OF CONTAINERS

*NOTE: Include the expiration date, if indicated on the bottle

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Figure 2 – Quality Verification Data Form

Quality Verification Data

Reagent ID # and description: _____

Manufacturer: _____

Lot #: _____

Laboratory use: _____

Requested analysis: _____

Date submitted for analysis: _____

Technician submitting aliquot / department: _____

Comments:

_____
_____
_____
_____

Analytical Results:

_____
_____
_____
_____

Analysts Approval (initials and date):

_____
_____
_____

Revision 2/97

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Figure 3 – Proposal Request Form

PROPOSAL REQUEST/PROJECT INFORMATION FORM

☐EXISTING CLIENT/ROUTINE WORK ☐QUOTE PENDING (requires follow-up) ☐QUOTE RECEIVED – Set up profile

Quote Prepared by: Choose One: LIMS Proposal No.: Revision: ☐Yes ☐No
Date of Quote Request: Date Required:

Company Name:
New Client ☐ Existing Client ☐ PC Assigned: Choose PC:
(PC assigned by Sue Baer.)

Client Contact:
E-mail:
Phone No.: ☐Fax to:

Report to Address: ☐in the LIMS
Project Name/No:
Project Location (state):
Contract No.:

Period of Performance:
One-Time Job ☐
No. of Samples: Date of Arrival:
Annual Contract ☐
Weekly☐ Monthly☐ Quarterly☐ Annual☐
Other:

Invoice to Address: ☐Same as above ☐in the LIMS
P.O. Required? ☐ Number:

Turnaround Time:
☐Routine—10 business days ☐Rush—Due:
TAT Required: 24-hr☐; 48-hr☐; 3-day☐; 4-day☐; 5-day☐; other
If rush, Approved by: Choose One: Surcharge used:
ALSI Rush Surcharge Schedule: 24-hour-200%; 48-hour-100%; 3-day – 75%; 4-day – 50%; 5-day – 35%; 6-9 day – 20%

Pricing Structure:
Price Sheet: STD Other
Standard Discount: Special Pricing: ☐
Ref LIMS Profile/Project:

Sample Containers Required: ☐Yes ☐No
☐One-time ☐Routine ☐Special Requirements (See Project Description.)
☐EnCore Samplers ☐MeOH/NaB Vials ☐Trip Blanks ☐Field Blanks
TO-15: ☐SUMMAs ☐ FLOW CONTROLLER FLOW RATE:
TO-13: ☐PUF filters ☐ SAMPLING PUMP
Fee(s): ☐No Fee

ALSI Field Services required: ☐Yes ☐No →
☐ALSI Sampling Fee: Sampling Date(s):
ALSI Field Equipment Required: Fee: ☐No Fee
ALSI Courier Services required:
☐ALSI Pickup/Delivery Fee: ☐No Fee

If No: ☐Client Sampling--Sampling Date(s):
☐Client Delivery ☐ Via FedEx/UPS
Expected Day(s) of Receiving samples:
ALSI Courier Services required:
☐ALSI Pickup/Delivery Fee: ☐No Fee

Project Description:
☐Special Project Description (see attached) ☐SOW (see attached) ☐Special Detection Limits (see attached)
☐New Method (Method Development approved by Alan, Anna, Helen.) ☐Special QC Limits (see attached)

Price Quotation: ☐ See Horizon LIMS Quote. ☐See below. ☐Refer to requestor's bid sheet attached.

Quantity	Matrix	Analysis	Method	Quoted Price
20	Soil	Example: VOCs – TCL List	8260	$160.00

Analytical Laboratory Services, Inc.

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PROPOSAL REQUEST/PROJECT INFORMATION FORM

Data Deliverable Requirements:

☐ **Standard Deliverables only** – Laboratory Report/COC

☐ **LIMS QC Report Fee:** ☐ No Fee

☐ **Data Package** – Specify Type: **Fee:** ☐ No Fee

- ☐ CLP-like (includes J values) ☐ Full New Jersey
- ☐ Raw Data ☐ NJ-Reduced
- ☐ Custom – Specify and attach specs.

☐ **EDDs: Fee:** ☐ No Fee

- ☐ ALSI Standard EDD (MS Excel) ☐ Landlinks
- ☐ NJ Hazsite EDD (**Aux data needed; samples must be reported with "U" flags.**)
- ☐ SEDD—Version Required:
- ☐ Client Specific--specify Current name in Horizon:
- ☐ New Custom EDD-Specify and attach specs.

☐ **Custom Deliverables.** Please specify, i.e., ICOC:

Fee: ☐ No Fee

Special QC Requirements: Fee: ☐ No Fee

- ☐ "Raw" Raw Data
- ☐ Other:
- ☐ DOD: ☐ USACE ☐ NAVY

Turnaround time required for deliverables (STD TAT is 28 calendar days from sample receipt.): days from receipt of samples at the lab.

Subcontracted Analysis: ☐ Not Applicable

Test(s): Sub'd to:
☐ QC Approved SUB **SUB Price:** **Fee to Client:**

Test(s): Sub'd to:
☐ QC Approved SUB **SUB Price:** **Fee to Client:**

Test(s): Sub'd to:
☐ QC Approved SUB SUB Price: **Fee to Client: :**

Test(s): Sub'd to:
☐ QC Approved SUB **SUB Price:** **Fee to Client:**

Test(s): Sub'd to:
☐ QC Approved SUB **SUB Price:** **Fee to Client:**

☐ **SPECIAL INFORMATION**

QC Requirements: ☐ Standard **Fee:** ☐ No Fee

- ☐ Trip Blank ☐ Field Blank
- ☐ Equipment Blank ☐ Rinsate Blank
- ☐ Field Duplicate ☐ MS/MSD
- ☐ Method Specific ☐ Other

Sample Disposal: ☐ Standard

☐ **Special**—No. of days: **Fee:** ☐ No Fee

Certification Requirements:

Pricing Review **Estimated Project Total:**

Manager Review (required for all proposals over $10,000)

Pricing Accurate? ☐ Yes ☐ No

Sufficient Equipment available to perform the job? ☐ Yes ☐ No

Sufficient Personnel available to perform the job? ☐ Yes ☐ No

Comments

Manager's Signature/Date: **Michael S. Farlling**

Date:

Analytical Laboratory Services, Inc.

Rev. 04/2006

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Addendum to Proposal Request Form

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Checklist for Samples Received from New York State

Note: The State of New York charges a fee for all samples collected and analyzed from the State of New York. Furthermore, New York has the right to audit this laboratory's accounting system for tracking all NY samples received. If discrepancies occur during an audit, a monetary fine may be assessed and ALSI could jeopardize their certification in the State of New York.

To insure proper handling of all samples received from the State of New York, please fill out this form, initial the checklist, and attach to the ALSI Proposal Request Form to ensure that all information regarding NY samples is completed and retained in the client file for future reference. If you have any questions or need assistance, please see the QA Manager.

ClientName:_____ ClientContact Name:_____

Project ID:_____ Phone No.: _____

Site Location: _____ Project Start Date: _____

ALSI Proposal No. _____ ALSI Contact: _____

Initial Here

_____ Are the samples from New York State: YES or NO

_____ If samples are from NY State, are they being taken from Federal Property. (i.e., Indian Reservation, Federal Building, Federal Landmark)? YES or NO If yes, indicate Federal Property: _____.

_____ Indicate the sample type (i.e., DW, WW, SHW): _____.

_____ The most recent NY certificates were reviewed to confirm certification for the required analytes. YES or NO If yes, who reviewed the certification: _____.

_____ NY certification was confirmed for the methods requested. YES or NO If yes, who confirmed the methods requested: _____.

_____ The client was directed to complete the chain-of-custody in accordance with ALSI requirements and to complete the information regarding NY samples and any required deliverable requirements. YES or NO

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Figure 4 – Preservation Logbook

DATE	SAMPLE NO.	TEST	PRESERVATION	pH RECEIVED	ADJUSTMENT AMOUNT ADDED	FINAL pH	RESIDUAL CHLORINE (+ or -)	Preservation Lot #	TURBIDITY (N.T.U.)	SULFIDE	INITIALS
					(mL)						
					(mL)						
					(mL)						
					(mL)						
					(mL)						
					(mL)						
					(mL)						
					(mL)						
					(mL)						
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					(mL)						
					(mL)						
					(mL)						
					(mL)						
					(mL)						
					(mL)						
					(mL)						
					(mL)						
					(mL)						
Turbidimeter was calibrated using 0.02 and 8.00 standards					Date:________		Page No.:				
					Tech:________						

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Figure 5 – Corrective Action Form

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ALSI Corrective Action Report (CAR)

To be Completed by Laboratory and Submitted to Customer Service

Date:_____ CAR Submitted By:_____
Dept:_____ Supervisor:_____

Chain of Custody No.(s):

Problem/Reason for Corrective Action:

___ Login Error *(2nd reviewed by:_____)*
___ Incorrect Preservative
___ Missed Holding Time
___ Calibration failure
___ QC failure due to sample matrix
___ QC failure NOT due to sample matrix
___ Sample Lost in process
___ Reporting Error
___ Other_____

Method:_____

Explanation of Problem:

Signature(s), where Applicable:

Analyst:_____
1st Review:_____
2nd Review:_____
Result Entered By:_____
Result Approved By:_____
Supervisor:_____

Immediate Corrective Action Taken: *By:_____ Date:_____*

Are there policies/procedures in place to prevent this from occurring? ***Yes ____ No ____ Not Applicable ____***

If Yes, What is the procedure, and why didn't it work?

If No, What procedure is needed to prevent this from occurring?
Target Date for Implementation: _____ *Person Responsible for Implementation: _____*

Customer Service Rep. Notified: _____ ***Date:*** _____

To be Completed by Customer Service and submitted to QA

Date:_____ Customer Service Rep.:_____
Project(s) / Client(s) involved:

Client Contacted? Yes ____ No ____
Date:_____ Person:_____

Action Taken *(If no action taken, explain why):*

Laboratory Notified of Client Response? Yes___ No ___ Not Applicable ___

To be Completed by QA and filed

Was action taken appropriate? ***Yes ___ No ___***
Is further action necessary? ***Yes ___ No ___***
If Yes, What action is needed?

Date:_____
QA Initials:_____

Modification of SOP needed? ***Yes ____ No ____***
If Yes, What is the procedure? *Has it been instituted? Yes ___ No ___*

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Figure 6 – LIMS Internal Chain of Custody

ALSI INTERNAL CHAIN OF CUSTODY

Storage Area:_____

Date of Transfer to Storage Area:_____ Time:_____ By (signature):_____

Laboratory ID #	Date and Time Removed By:	Date and Time Returned By:	Purpose:	Sub-sample ID #	Comments

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Figure 7 – Sample Non Conformance Report

Analytical Laboratory Services, Inc.
Sample Nonconformance Report

To be Completed by Laboratory in Cases of QC Failure Due to Sample Matrix

Date: _____ ***Analyst:*** _____
Dept: _____ ***Supervisor:*** _____

Method No.: _____

Chain of Custody No.(s):

Type of QC Non-conformance:

_____ Surrogate Failure
_____ Matrix Spike Failure
_____ Matrix Spike Duplicate or Sample Duplicate Failure
_____ Internal Standard Failure
_____ Other _____

Supporting Evidence of Sample Matrix Effects as Cause of Failure in Analytical Batch:
Check all that apply:

_____ Non-detectable Blank
_____ Initial Calibration within Method Specifications
_____ Continuing Calibration or Calibration Verification Standard within Method Specifications
_____ Laboratory Control Sample Recovered Within Acceptable Limits
_____ Appearance of sample is non-homogeneous
_____ Other: _____

Was Sample Re-extracted and/or Re-analyzed to confirm Matrix Effects? Yes No

Are Matrix Effects evident in Historical Samples from this client and/or collection site? Yes No

Comment Included on Final Lab Analysis Report:

This form is to be filed with associated sample(s) raw data.

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Figure 8 – External Complaint Form

External Complaint Form

Please be as specific and complete as possible.

Customer Name:		Complaint File Number:	
Client Contact:		Specific Job/Phase/Task:	
Date/Time:		Applicable COC Numbers:	
Person Making Complaint:		ALSI Contact:	

Specific Items Discussed:

Resolution:

Departments Involved with Complaint:

☐ Biomonitoring	☐ Microbiology		
☐ Client Services	☐ Prep Lab		
☐ Field Services	☐ QA/QC		
☐ GC/MS	☐ Sample Receiving		
☐ GC (Direct Inject)	☐ TOX/TOC		
☐ GC (Volatiles)	☐ Wet Chemistry	Report Reviewed By:	
☐ Metals	☐ Miscellaneous	Customer Service Informed:	

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Figure 9 – Internal Complaint Form

ALSI INTERNAL COMPLAINT FORM

Employee Initiating Complaint:	**Specific Job/Phase/Task:** **Date:**
Complaint:	
Resolution:	
Complaint Received By:	**Complaint Reviewed By:**
Complainant Signature:	

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