# Laboratory Competence
# Quality Management System
## ISO 17025:2017
# Quality Manual

THE UNIVERSITY OF GEORGIA
COOPERATIVE EXTENSION
Colleges of Agricultural and Environmental Sciences & Family and Consumer Sciences


2300-2400 College Station Road, Athens
Georgia, GA 30602


This Quality Manual meets the requirements of ISO 17025:2017

**Certificate No: UCO1309**

# Introduction

**Purpose**
This Quality Manual contains all the requirements that our laboratory uses to demonstrate our quality management system, technical competence, and valid results.

The Agricultural and Environmental Services Laboratories (AESL) comprise of three cooperating units:

- Soil, Plant and Water Lab
- Feed and Environmental Water Lab
- Crop and Environmental Quality Lab

AESL is headed by a Director and staffed with an appropriate management team and competent staffs who use the state-of-the-art analytical equipment, methods and facilities to help improve the quality of analyses.

**Mission**
The mission of the Agricultural and Environmental Services Laboratories (AESL) is to provide objective analytical services to agricultural producers, consumers, and agribusinesses. These services combine with unbiased interpretations and recommendations contribute to a competitive agriculture, a healthy environment and an improved quality of life. As a unit of the Cooperative Extension Service within the College of Agricultural and Environmental Sciences, the AESL achieves its mission primarily through the support of County Extension Agents and other faculty members who are engaged in research and outreach activities. Our work is accomplished using state-of-the-art methodology and technology employed by skilled staffs dedicated to excellence.

Section 7 specifies how we demonstrate technical competence in our laboratory.

Section 8 specifies how we demonstrate sound management and maintain client satisfaction.

All personnel are to take an active role in establishing, implementing, and maintaining our quality management program. We do not separate quality from our daily business. Quality is integrated into every facet of the decision-making process in the management of our laboratory and the science that we practice.

# Control of Documentation

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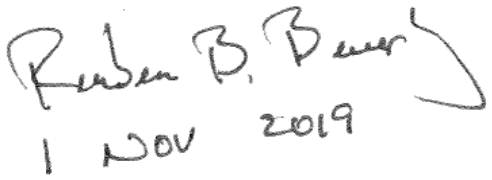
**Authorization**

Authorized by: Dr. Reuben B. Beverly




Position: Director

Authorized Date:

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**Distribution**

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# Document Amendments

All copies of this Quality Manual (QM) are kept under strict control to prevent the system from becoming unreliable. The following controls ensure that the system remains current and valid.

1. All copies of the manual are clearly numbered, and the holder recorded.

2. Each page in the manual carries its own number.

3. The **Management Representative** is responsible for all revisions and additions being recorded.

4. Changes are suggested by any employee but receive approval before being entered into the QM.

5. All changes are recorded on the Amendments Table below and appropriate pages in each QM changed.

## Amendments Table

| Doc. No. | Page No. | Rev. | Date | Description of change | Authorization |
|---|---|---|---|---|---|
| All | All | 1 | 06/01/2016 | First issue | Director |
| All | All | 2 | 10/30/2018 | Organization chart is modified | Interim Director |
| All | All | 3 | 07/20/2019 | Organization chart is modified | Director |
| All | All | 3 | 10/20/2019 | Transition to ISO 17025:2017 | Director |
| All | All | 4 | 12/10/2019 | Verb tenses are verified; Decision rule is added | Director |
| | | | | | |
| | | | | | |

## 1. Scope

This Quality Manual facilitates:

- Recognition of technical competence for standardized methods, non-routine methods, and laboratory-developed methods we perform
- Testing capabilities and/or services we provide
- Total quality for our administrative and technical systems
- Audits by clients, regulatory authorities and accreditation bodies
- Meeting the requirements of ISO 17025
- Client satisfaction

The Quality Manual contains the policies and procedures used for the quality management system of AESL:

- To generate test results that are technically sound and have the required accuracy and precision
- To meet client requirements
- To meet regulatory requirements
- To maintain client satisfaction

The policies and procedures of the Quality Manual are applicable to all testing performed in the laboratory unless superseded by a project or client-specific quality plan.

**Quality Control and Quality Assurance**

**Quality Control (QC)** refers to steps taken to monitor and ensure precision and accuracy of test results. Quality Control practices include the analysis of quality control samples with each set of samples. These include calibration standards, certified reference materials, spiked samples, duplicate sample analysis, and blanks. Additional QC measures the analysis of blind duplicated samples and participation in various proficiency testing programs.

**Quality Assurance (QA)** refers to a completely separate and independent monitoring of laboratory studies and Quality Control activities. Quality Assurance activities include the internal audit program, review of data packages, evaluation of non-conformances, and an annual management review of quality data. The laboratory follows ISO 17025 standard as it is applicable and significant for the testing requested by clients.

## 2. Normative References

### Reference List

ISO/IEC 17000, Conformity assessment – Vocabulary and general principles

ISO/IEC 17025:2017 – General Requirements for the Competence of Testing and Calibration Laboratories

AESL Procedures Manual PM 01

### Cross-references

This manual is numerically aligned with the international standard ISO 17025. It is expected that this proves useful during accreditation audits and expedite the process.

## 3. Terms and Definitions

For the purposes of this manual, the following documents and their corresponding definitions apply: ISO/IEC 17000; ISO/IEC Guide 30; ISO Council Committee on Conformity Assessment (CASCO); ISO 9000; ISO 5725-1; ISO 17025; AOAC; and International Vocabulary of Basic and General Terms in Metrology (VIM).

Accreditation – formal recognition of a laboratory by an independent science-based organization that the laboratory is competent to perform specific tests.

Document – a hard copy or electronic file containing information, data or procedures that are generally in use. A current SOP is an example of a document. An obsolete version of an SOP that has been archived is an example of a record.

Non-standard testing –any analysis that is not listed on the standard analysis but is offered by the laboratory.

Record – a hard copy or electronic file containing data, results, observations or other information relevant to laboratory testing and operations. In general, a record has been completed and stored and is no longer in daily use.

Standard Method – any laboratory methods for which a Standard Operating Procedure has been established.

Proficiency testing – evaluation of participant performance against pre-established criteria by means of inter-laboratory comparisons.

Decision rule –a rule that describes how measurement uncertainty will be accounted for when stating conformity with a specified requirement

Risk –an effect of uncertainty, positive or negative. Risk is expressed in terms of a combination of the consequences of an event (including changes in circumstances) and associated likelihood of occurrence. It is characterized by reference to potential events and consequences or a combination of these.

# 4. General requirements

### 4.1. Impartiality

4.1.1. AESL undertakes activities impartially and it is structured and managed to safeguard impartiality.

4.1.2. AESL management is committed to impartiality.

4.1.3. AESL demonstrates that it is independent of any undue commercial, financial or any other pressures, and any conflicts of interest which may endanger the trust in its independence and integrity in relation to its testing activities so as not to compromise impartiality.

4.1.4. AESL identifies risks to its impartiality on an on-going basis. This includes those risks that arise from activities, or from AESL's relationships, or from the relationships of AESL personnel. However, such relationships do not necessarily present ASEL with a risk to impartiality.

4.1.5. If a risk to impartiality is identified, AESL is able to demonstrate how to eliminate or minimize such risk.

### 4.2. Confidentiality

4.2.1. AESL ensures the protection of customers' confidential information and proprietary rights, including protecting the electronic storage and transmission of results.

4.2.2 AESL is responsible, through legally enforceable commitments, for the management of all information obtained or created during the performance of laboratory activities. AESL informs the customer in advance, of the information it intends to place in the public domain. Except for information that the customer makes publicly available, or when agreed between AESL and the customer (e.g. for the purpose of responding to complaints), all other information is considered proprietary information and will be regarded as confidential.

4.2.3 When AESL is required by law or authorized by contractual arrangements to release confidential information, the customer or individual concerned will, unless prohibited by law, be notified of the information provided.

4.2.4 Information about the customer obtained from sources other than the customer (e.g. complainant, regulators) is confidential between and the customer and AESL. The provider (source) of this information is confidential to AESL and will not be shared with the customer, unless agreed by the source.

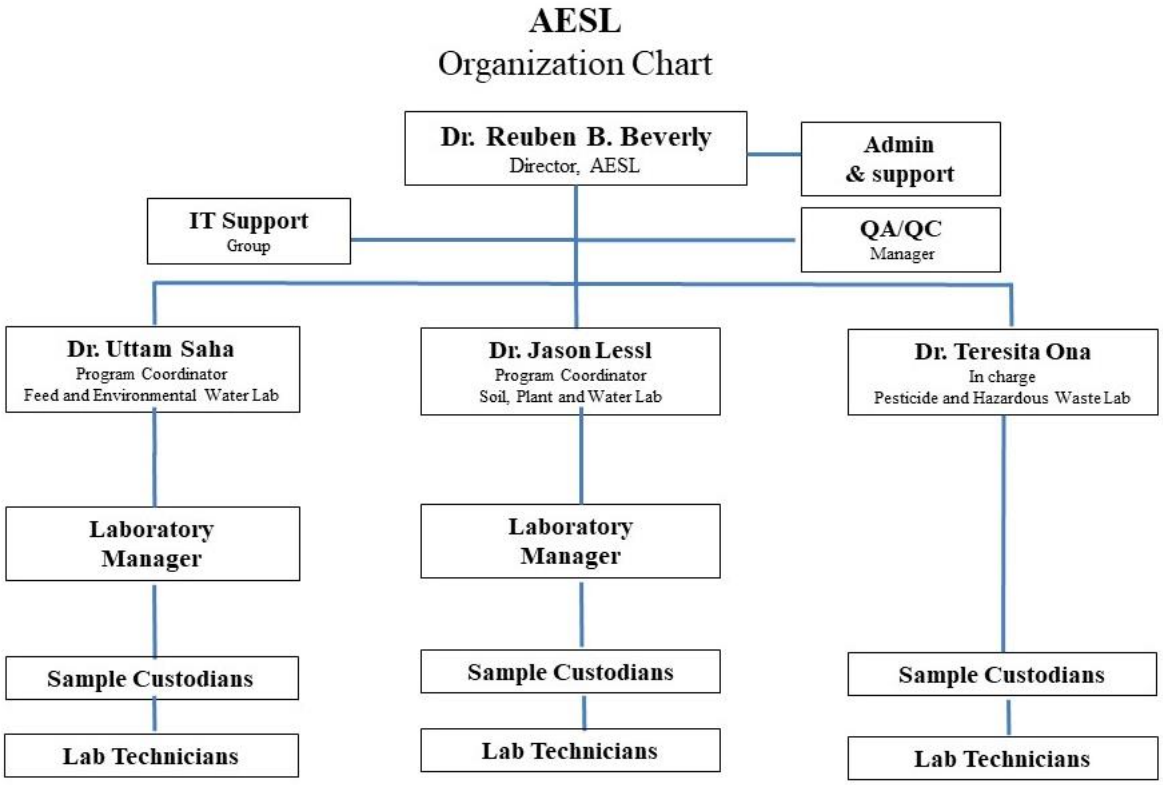
4.2.5 Personnel, including any committee members, contractors, personnel of external bodies, or individuals acting on the AESL's behalf, keep confidential all information obtained or created during the performance of AESL activities, except as required by law.

## 5. Structural requirements

5.1. AESL demonstrates that it is an entity that is held legally responsible and acknowledges its responsibility to carry out testing activities to the requirements of ISO/IEC 17025:2017 and satisfies the needs of its customers and other interested parties.

5.2. The AESL director takes the overall responsibility for the management of the laboratories, and provides leadership of the programs and staffs in the following laboratories:

- Soil, Plant, and Water Laboratory
- Feeds and Environmental Water Laboratory
- Crop and Environmental Quality Laboratory




5.3. AESL also appoints managerial and technical personnel who, irrespective of other duties, have the responsibility of the implementation, maintenance and improvement of the management system and reports directly to senior management on its effectiveness. Other suitably experienced and qualified personnel are appointed as internal Auditors and are aware of their responsibilities for impartiality and confidentiality. Their interrelationships are defined and suitably qualified and experienced personnel are appointed to act as deputies for key management roles.

5.4. AESL establishes, implements, maintains, and continually improves a management system appropriate to the scope of its activities. Details of the system have been communicated to, are understood by all personnel. Details of the Quality Management System have been documented in a Quality Manual and a supporting Procedures Manual.

5.5. The effective implementation of the Quality Management System is verified by regular inspections, reviews and audits. This allows comparison of the management practice against the requirements of the written procedures on Quality Management System standards. Corrective action is taken where necessary and is subsequently reviewed for effectiveness.

5.6. A Quality Policy is issued under the authority of the Director which provides the framework for the setting of overall objectives. These objectives are communicated to all personnel and are subject to regular review with the intent of supporting the improvement program.

5.7. All personnel are aware of the importance of meeting customer requirements and of adherence to the relevant statutory and other regulatory requirements. All the personnel have the authority and resources needed to carry out their duties.

# 6. Resources requirements

## 6.1. General

AESL has technical procedures and policies in place to determine the correctness and reliability of test results. The correctness and reliability of test results are impacted by many factors:

- Analyst technique & staff performance
- Facility and environmental conditions
- Test methods and method validation
- Equipment
- Measurement traceability (reference materials and calibration)
- Sampling (excluded in AESL Scope)
- Handling of test items

These factors are addressed by the technical procedures and policies of AESL. The extent to which these factors contribute to total measurement uncertainty differs between types of tests. These factors are taken into consideration and evaluated during testing, the training and qualification of personnel, the development and validation of test methods and procedures and in the selection and calibration of equipment.

## 6.2. Personnel

Job descriptions are documented for all managerial, technical, key support staff and those carrying out testing. The competence of all personnel performing tasks relating to testing is ensured based on their education, training and experience. When necessary, members of staff are required to demonstrate specific skills and/or to hold personal certification. When staff is undergoing training, adequate supervision is provided.

Personal goals are formulated with respect to the skills, education and experience of testing. Suitable training is identified, carried out and monitored for effectiveness.

All personnel are employed by or are under contract to the AESL. Where contract personnel are used, adequate supervision is provided.

Specific personnel are authorized to perform testing and to issue testing reports. Records are maintained of such authorizations together with the skills, education, experience and applicable personal certifications

## 6.3. Laboratory facilities and environmental conditions

The AESL ensures that the environmental conditions under which measurements are made do not invalidate the results. All relevant environmental conditions are monitored as appropriate to the technical activities concerned. Measures are taken to ensure good housekeeping. Testing is suspended when the environmental conditions may invalidate the results.

Effective separation exists between neighboring areas in which there are incompatible activities and measures are taken to prevent cross-contamination. Access to the laboratory is controlled and restricted to those having business there.

**6.4. Equipment**

The AESL is furnished with all items of measuring and test equipment required, including those needed for the handling of items for testing and measurement. The equipment is capable of carrying out the testing required and of meeting the requirements for accuracy.

All measuring equipment is standardized before use. It is calibrated and re-checked at defined intervals thereafter in order to establish that it meets the laboratory's requirements for accuracy. Records of calibration are maintained, and the equipment is identified to indicate the calibration status. Equipment is safeguarded against any adjustments which invalidate testing results. Where calibrations give rise to a set of correction factors, these are documented and updated as necessary.

All measuring equipment is operated only by authorized personnel in accordance with the relevant manuals and laboratory instructions. When measuring equipment must be transported, stored, maintained or goes outside the direct control of the laboratory, procedures are established to ensure proper function thereafter.

Measuring equipment that has been damaged or is suspect in any way is taken out of service until it has been repaired and its proper function established. The effect of the defect on any previous testing is evaluated and any necessary action taken under the procedures for the control of non-conformance.

**6.5. Metrological Traceability**

The calibration program for all items of measuring equipment (including reference standards) establishes an unbroken link traceable to the International System of Units (SI) via the relevant primary national or international standards. When using external calibration laboratories, traceability is assured by means of the calibration certificate issued by that laboratory.

Where it is not possible to make calibrations strictly in SI units or such calibrations are not relevant, other appropriate measurement standards may be used, such as those provided by a competent supplier that is recognized and accepted by all parties concerned.

If it can be established that the contribution from calibration has little or no effect on the total uncertainty of measurement, then the laboratory requirement for calibration may be waived. This is providing the laboratory can ensure that the equipment used can provide the uncertainty of measurement needed.

**6.6. Externally provided products and services**

Procedures are established for the selection and control of goods and services that affect the quality of the testing. Goods and/or services are not used until they have been verified as meeting the requirements of the testing.

Purchasing documents clearly define the goods and/or services ordered and are reviewed and approved for technical content before release. The suppliers of goods and/or services which affect the quality of the testing are evaluated and approved and records are kept of such evaluations.

# 7. Process requirements

### 7.1. Review of requests, tenders and contracts

All requests to quote, tender and contract (including any amendments to previous agreements and the nature and extent of any sub-contracted work) are reviewed to ensure that:

The requirements, together with the methods to be used, are adequately defined, documented and understood.

The laboratory has the capability and resources to meet the requirements. Any sub-contractors are selected from an authorized register.

The appropriate testing method is selected and is capable of meeting the customer's requirements.

Records of reviews and any pertinent discussions are maintained, and the customer is kept informed of any deviation from the contract.

### 7.2. Selection, verification and validation of methods

The AESL uses appropriate methods for all testing within its scope throughout the entire work process including, where appropriate, the measurement of uncertainty and statistical techniques.

Instructions are available for the use and operation of all relevant equipment and the handling of testing samples. These instructions are kept current and are available to the personnel concerned. Any deviations from these instructions are technically justified, documented, authorized and accepted by the customer.

The AESL uses testing methods which meet the requirements of the customer and are valid for the work undertaken. If no method is specified by the customer, recognized standard methods are used or methods are developed by the laboratory. Any laboratory developed methods are developed by suitably qualified personnel equipped with adequate resources.

Any non-standard methods used are subject to agreement by the customer and are validated as necessary before use. Validation is also carried out before any standard methods are used outside their intended scope. The range and accuracy of the values obtained from validated methods are assessed and are relevant to the intended needs.

Procedures are used for the estimation of uncertainties in measurement based on knowledge of the capabilities and scope of the method used. When estimating the uncertainty of measurement, all relevant uncertainty components are taken into account.

Calculations and data transfers are subject to appropriate checks in a systematic manner. When computers or automated equipment are used, appropriate software is documented and validated,

the security and confidentiality of data are protected at all stages and the equipment and its operating conditions are maintained to protect the integrity of the measurements.

When estimating the uncertainty of measurement, all uncertain components which are of importance in the given situation shall be taken into account using appropriate methods of analysis.

**7.3. Sampling**

The AESL does not perform sample collection, so this clause is excluded from the Lab Quality Management System. But a procedure was adopted at AESL that details work instructions for sample protection, storage, and identification procedures used to ensure sample accountability and integrity.

**7.4. Handling of test or calibration items**

Procedures are established for the transportation, receipt, handling, protection and storage of items for testing. Such items are identified throughout all stages of testing. The identification is such that the items are not confused physically with other items referred to in records and reports.

Any departure from normal conditions noted upon receipt of the item(s) for testing or when the item(s) does/do not conform to the description provided, the customer is informed, and further instructions sought before testing is commenced.

Items for testing are protected as necessary against deterioration, loss or damage while in the care of the AESL.

**7.5. Technical records**

AESL has established and will maintain procedures for the identification, collection, indexing, access, filing, storage maintenance and disposal of quality and technical records. These include those resulting from internal audits, management reviews, corrective and preventive action.

Records are legible and stored so they are readily retrievable by authorized persons. There is an appropriate storage for records in order to prevent damage or deterioration. The retention times for records are established.

All records are kept secure, in confidence and are protected against unauthorized access or amendment. Data held electronically is backed up regularly and protected from malicious code.

Records of original observations and derived data are kept enabling an audit trail to be established for each testing report issued. Technical records contain sufficient information to allow identification of factors affecting the uncertainty of the observations and to allow the testing to be repeated under conditions as close as possible to the original. The person responsible for the observations, testing and checking of results is identified.

Observations, data and calculations are recorded at the time they were made and are identifiable to the specific task.

Errors in records are not erased or made illegible but are crossed out and the correct value entered alongside. The person making the correction is identifiable. Records held electronically are similarly protected against the loss of original data.

**7.6. Evaluation of measurement uncertainty**

Process for estimating uncertainty includes: identifying sources/contributors/; quantifying uncertainty, calculating the combined uncertainty and expanded uncertainty, and reporting uncertainty.

At AESL, standard deviation of quality control sample runs to be taken as combined uncertainty. standard deviation arrived after minimum of 10 runs is multiplied by a coverage factor of k=3, giving a confidence level of approximately 99%, to produce expanded uncertainty.

Uncertainty budget records are filed along with respective instruments records for reference at AESL.

**7.7. Assuring the quality of results**

Quality control procedures are established for monitoring the validity of testing undertaken. Quality control data are analyzed and, when they are found to be outside pre-defined criteria, planned action is taken to correct the problem and to prevent incorrect results from being reported.

**7.8. Reporting of results**

The results of each reporting or series of testing are reported accurately, clearly, unambiguously and objectively in accordance with the testing methods used and any instructions from the customer. The results are recorded in the form of a testing report and in a format intended to minimize the possibility of misunderstanding or misuse.

Each testing report contains the information agreed with the customer and is uniquely identified. Any deviations or waivers from the testing method(s) are included in the testing reports and, where necessary, a statement of compliance with the requirements or specifications.

Where appropriate, opinions and interpretations are included and are clearly identified as such.

Testing reports are transmitted electronically to ensure the security, integrity and confidentiality of transmitted data is maintained at all stages.

Any amendments to testing reports are issued in the form of a new document clearly identifiable as an amendment to the original report.

**7.9. Complaints**

A procedure has been established for the recording and resolution of complaints. Records of investigations and corrective actions are maintained.

Complaints are immediately investigated within a timeframe established by the AESL to ensure the process is not delayed. Complaints lodged by external customers or those that seriously impact laboratory quality are investigated by senior management. Complaints from internal customers or those of a less serious nature are investigated at lower management levels.

**7.10. Management of nonconforming work**

Responsibilities for the management of non-conforming work are defined. Appropriate actions are taken where necessary to halt any non-conforming work and withhold the issue any certificates until the non-conformance is evaluated and suitable corrective action taken. Where necessary, the customer is notified, and any non-conforming work is recalled.

A procedure is described for development to a corrective action plan / report and follow-up monitoring to determine that the corrective action has been performed and is effective.

**7.11. Control of data-information management**

At AESL, the AGDB database is used for the collection, processing, recording, reporting, storage of data and information.

The database is maintained by IT engineers, validated, updated, and backed up on a daily basis.

Any unauthorized access is prohibited; any access to the database is password protected and monitored.

Calculation and data transfer are programmed and checked in a systematic manner.

All the electronic version of manuals, instructions and SOPs, relevant to AESL information management systems, are stored on internal drives and readily available to internal access.

# 8. Management requirements

## 8.1. Options

AESL establishes, documents, implements and maintains a management system that is capable of supporting and demonstrating the consistent achievement of the requirements of the international standard ISO 17025: 2017 and assuring the quality of the AESL results.

AESL also implements a management system in accordance with option A.

## 8.2. Management of system documentation (Option A)

AESL establishes, implements, maintains and continually improves a management system appropriate to the scope of its activities. Details of the Quality Management System are documented in a Quality Manual and a supporting Procedures Manual.

## 8.3. Control of management system documents (Option A)

Procedures are established and are maintained to control all documents forming part of the Quality Management System. Documents are approved for use prior to issue and a document Master Register is created from which the current revision status can be determined.

Documents are uniquely identified, and authorized versions are available at all relevant locations. The documents are reviewed regularly to ensure continued suitability and fitness for use. Changes to documents are controlled so that amendments are clearly identifiable.

Documents including those generated as testing results are uniquely identified, including a reference of the date of issue and/or revision identification, page numbering, the total number of pages or a mark to signify the end of the document and the issuing authority.

Testing results are issued by authorized personnel to the clients and are stored on a secure database which is regularly backed up.

## 8.4. Control of records (Option A)

The AESL establishes and maintains procedures for the identification, collection, indexing, access, filing, storage maintenance and disposal of quality and technical records. These include those resulting from internal audits, management reviews, corrective and preventive action.

Records are legible and stored so they are readily retrievable by authorized persons. There is appropriate storage for records in order to prevent damage or deterioration. The retention times for records are established.

All records are kept secure, in confidence and are protected against unauthorized access or amendment. Data held electronically is backed up regularly and protected from malicious code.

Records of original observations and derived data are kept enabling an audit trail to be established for each testing report issued. Technical records contain sufficient information to allow identification of factors affecting the uncertainty of the observations and to allow the

testing to be repeated under conditions as close as possible to the original. The person responsible for the observations, testing and checking of results is identified.

Observations, data and calculations are recorded at the time they were made and are identifiable to the specific task.

Errors in records are not erased or made illegible but are crossed out and the correct value entered alongside. The person making the correction is identifiable. Records held electronically are similarly protected against the loss of original data.

**8.5. Action to address risks and opportunities (Option A)**

At AESL, the risk and opportunities associated with laboratory activities are considered in order to give assurance that management system achieves intended results, to enhance opportunities to achieve the purpose and objectives, to prevent and reduce undesired impacts and potential failures in the activities.

The risk management process, as the constituent part of the "action to address risks and opportunities" process, involves the systematic application of policies, procedures and practices to the activities of communication and consulting, establishing the context and assessing, treating, monitoring, reviewing, and recording risk.

This process is implemented in four phases

- Planning actions to address risks and opportunities. Project of risk management framework.
- Integration and implementation of actions to address risks and opportunities into QMS processes.
- Evaluation of the effectiveness of actions to address risks and opportunities. Monitoring and analysis of risk management framework.
- Achieving improvement.

**8.6. Improvement (Option A)**

AESL has a policy of continual improvement in relation to the effectiveness of its management system through the use of the quality policy and related objectives, audit results, the analysis of performance data, corrective and preventive actions and management review.

Feedback, both positive and negative, from extension offices or clients, is solicited from time to time. This information is used to improve AESL management system and sample analysis, and to offer better services for customers.

**8.7. Corrective action (Option A)**

Authorities are defined for the implementation of corrective action when non-conformance is detected.

The root cause of any non-conformance is determined, and suitable corrective actions selected, documented, implemented and reviewed for effectiveness. Where necessary, additional internal

audits of the area(s) or activity where the non-conformance is detected are planned and carried out.

**8.8. Internal audits (Option A)**

Internal audits of the AESL's activities are planned and carried out to verify that its operations comply with its own procedures and of the requirements of the ISO/IEC 17025:2017 Standard.

Each element of the management system is audited within a 12-month period ensuring that each element is reviewed at least annually. Audits are performed by suitably trained and qualified personnel who are, as far as possible, independent of the area being audited.

Corrective actions are identified and implemented. If any corrective actions indicate that testing results are affected, then customers are informed in writing.

The results of audits are recorded along with any corrective actions implemented. Follow up activities are recorded, and the effectiveness of corrective actions reviewed

**8.9. Management review (Option A)**

Reviews of the Quality Management System are held at planned intervals (and are carried out annually) to ensure its continued suitability and effectiveness. Findings and actions are recorded and implemented within an appropriate and agreed time table.

The review covers all the elements in the quality management system of the ISO 17025 standard: 2017 to ensure the suitability and effectiveness of these quality management system elements.

# 9. Appendices

## 9.1 AESL Accreditation Scope

## Scope of AESL Quality Management System

This scope is produced in line with the requirements of the latest quality management system standard ISO 17025. We ensure that it is made available to all interested parties.

The scope details the types of tests and services covered and justification for any requirements not covered by the scope.

## Scope of AESL Management System

**Agricultural and Environmental Services Laboratories** locate in

2400 & 2300 College Station Road
Athens, Georgia 30602-9105

## Responsible for:

## Drinking Water Tests performed using EPA Approved Methods/Standard Methods for measuring *bacteria, minerals, trace metals, nitrate/nitrite, alkalinity and anions;*

## Soil tests for *pH and minerals*;

## Feed and forage tests for *moisture, crude fiber, crude fat, crude protein, neutral detergent fiber, acid detergent fiber, and minerals;*

## NIR forage tests for *moisture, crude protein, neutral detergent fiber, and acid detergent fiber*;

## Plant tissue tests for *minerals.*

# AESL Lab Accreditation for ISO 17025

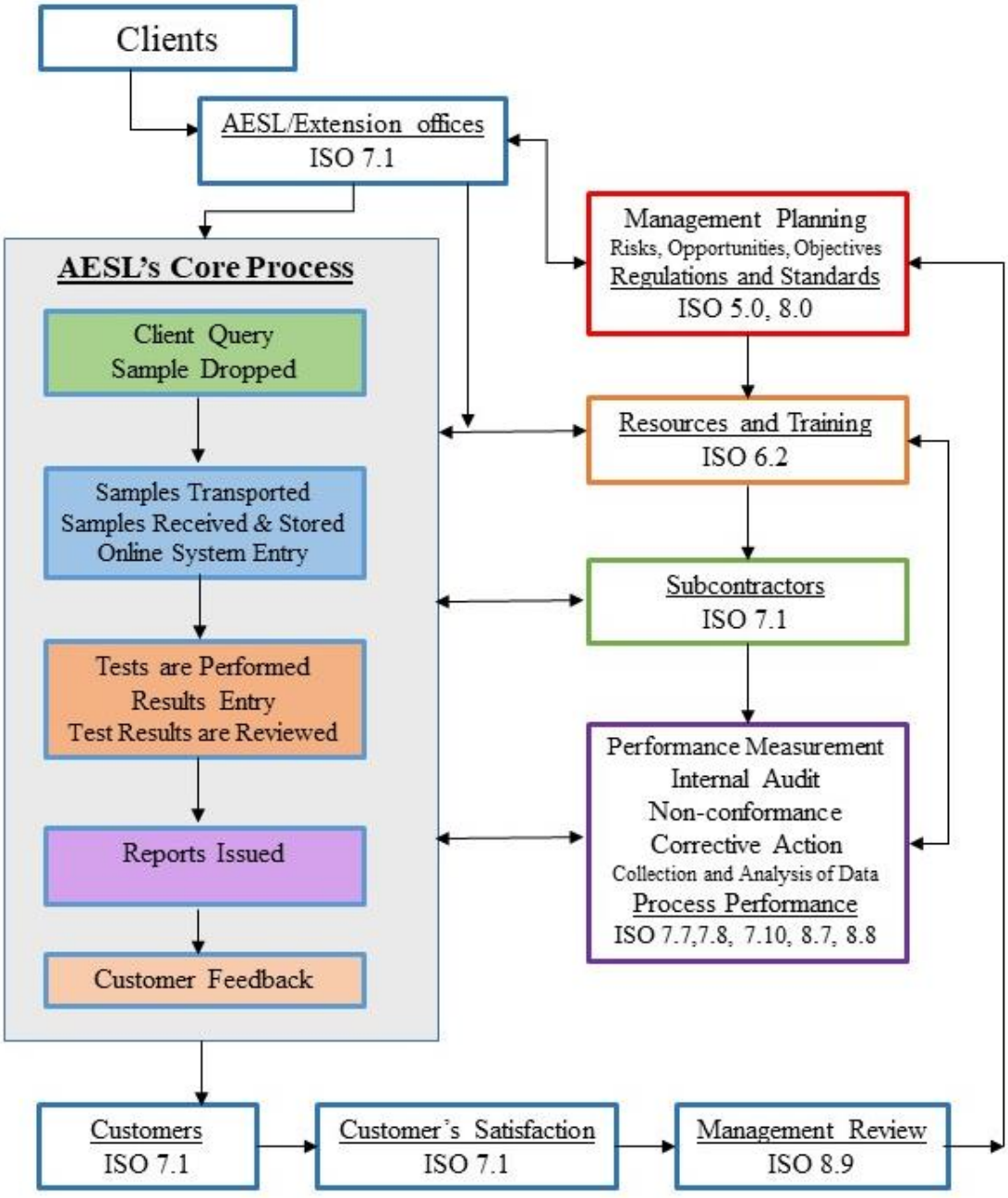
| No. | Test | Sample Type | Methods | Equipment | SOP |
|---|---|---|---|---|---|
| 1 | Bacteria (Microbiology) | Water | SM9223B | Sealer, incubator, UV lamp, radiometer, water bath | SOP 601 r3 |
| 2 | Minerals | Water | EPA 200.7 | ICP-OES | SOP 504 |
| 3 | Trace metals | Water | EPA 200.5 | ICP-OES | SOP 708 |
| 4 | Nitrate/Nitrite | Water | SM 4500-$NO_3$ F | Flow injection analyzer | SOP 510 |
| 5 | Alkalinity | Water | SM 2320-B | pH meter | SOP 606 r3 |
| 6 | pH-water | Water | Standard Method 4500-$H^+$ | pH meter | SOP610r4 |
| 7 | pH-soil | Soil | EPA 9045D | pH meter | SOP 539 r2 |
| 8 | Minerals-soil | Soil | EPA 200.7 on Mehlich 1 Extract | ICP-OES | SOP 538 r2 |
| 9 | CP-Feed, forage | Feed & Forage | AOAC: 990.03 | Rapid N analyzer, balance | SOP 657 r2 |
| 10 | NDF-forage | Feed & Forage | AOAC: 2002.04 | Fiber Analyzer, Oven, balance | SOP 636 r2 |
| 11 | ADF-forage | Feed & Forage | AOAC: 973.18 | Fiber Analyzer, Oven, balance | SOP 637 r2 |
| 12 | Moisture- Feed, forage | Feed & Forage | AOAC: 930.15, NFTA: 2.2.2.5 | Oven, balance | SOP644 r2<br>SOP645 r2 |
| 13 | Anions | Water | EPA300.0 | Ion Chromatography | SOP521 r3 |
| 14 | Moisture,<br>CP,<br>ADF,<br>NDF | Feed & Forage | (NIR method)<br>AAFCO 010.11,<br>AAFCO 002.11,<br>AAFCO 008.1,<br>AAFCO 009.11 | NIR instruments | SOP664 r3 |
| 15 | Minerals | Plant tissue | AOAC: 985.01 | ICP-OES | SOP512 r2 |
| 16 | Minerals | Feed & Forage | AOAC: 968.08(D) | ICP-OES | SOP 643 r2 |
| 17 | Crude Fiber | Feed & Forage | AOCS: Ba 6a-05 | Fiber Analyzer, Oven, balance | SOP638 r2 |
| 18 | Crude Fat | Feed & Forage | AOCS: Am 5-04 | Ankom extractor, Oven, balance | SOP627 r2 |

**Decision Rules**

1. Given the fact that AESL mostly serves farmers, home owners, and general public, the analytical method references are not included on the client reports as a default practice to avoid unnecessary complexity of understanding the cited references.
2. However, the AESL's client reports include an option for the interested clients to request the analytical methods used.
3. Once a request for the analytical method references are made by the clients, the AESL complies with the request.

## 9.2 AESL Process Charts

| AESL-Process Interaction | | | | | Page 1 of 2 | | |
|---|---|---|---|---|---|---|---|
| Doc. No. | AESL-PO-01 | Issue. No. | 01 | Issue Date | 01-June-2016 | Updated by | Yang |



## AESL-High Level Process

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| Doc. No. | AESL-PO-02 | Issue. No. | 01 | Issue Date | 01-June-2016 | Updated by | Yang |
|---|---|---|---|---|---|---|---|

| No | Responsibility | Process | |
|---|---|---|---|
| 1 | | Start | |
| 2 | AESL/Extension office | Client's request | Process starts with client contacting AESL or Extension Office for information about their testing requirements. |
| 3 | Client & AESL/Extension office | Info Clear? (No) / Information & Forms provided | Process is explained to client and appropriate forms are provided |
| 4 | Samples Custody | Info Clear? (Yes) / Sample is dropped & transported | Samples are dropped with appropriate forms filled and samples are transported to the AESL or samples are directly dropped at AESL |
| 5 | Lab Technician | Sample is received & stored | Samples are received and stored as appropriate |
| 6 | Lab Technician | Testing is performed | Testing is performed |
| 7 | Lab Technician | Info Clear? (No) / Checks & Prepare report | Results are checked and validated |
| 8 | Lab Technician/ Program Coordinator | Info Clear? (Yes) / Report Entry & Review | Data is entered into online database, Reports are reviewed by Lab Manager or Program Coordinator |
| 9 | Lab Technician | Report is submitted to client | Validated & Formally approved reports are submitted to the clients |
| 10 | | Stop | Clients' feedback is collected |

## 9.3 AESL Quality Policy & Objectives

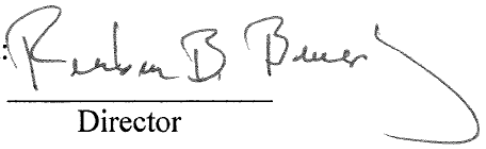
### Quality Policy

The Management of **Agricultural and Environmental Services Laboratories** is operating under the control of a quality management system along the lines laid down in ISO 17025:2017 standard. Our mission is to provide objective analytical services to agricultural producers, consumers and agribusiness and this objective is accomplished using state-of-the-art methodology and technology employed by a skilled staff dedicated to excellence.

The AESL places particular emphasis on obtaining client satisfaction by:

- Providing high quality & timely analyses and continuously meeting or exceeding the requirements and expectation of our clients
- Ensuring the highest quality of our test results through conscientious following of applicable quality assurance plans and standard operating procedures
- Ensuring that its management and staff are fully trained to meet the requirements of the business and its customers
- Ensuring compliance with regulatory, safety requirements and guidelines of regulatory agencies with respect to installation of equipment, handling of samples and conducting of tests
- Working closely with its clients and suppliers in seeking to establish the highest quality standards
- Adopting a forward-looking view on future business decisions which may have an impact on quality
- Training all members of staff in the needs and responsibilities of quality management system

Responsibility for upholding this policy is AESL-wide under the guidance and with the assistance of the senior management who encourage the personal commitment of all staff to address quality as part of their skill base.

Signed:  Date: 1 NOV 2019

Director

## Quality Objectives

**To achieve consistent quality standards and customer satisfaction**

Measurable through the use of Non-conformance Reports, Quality of Service Provided, Quality assurance records, Clients Feedback, and Complaints/compliments

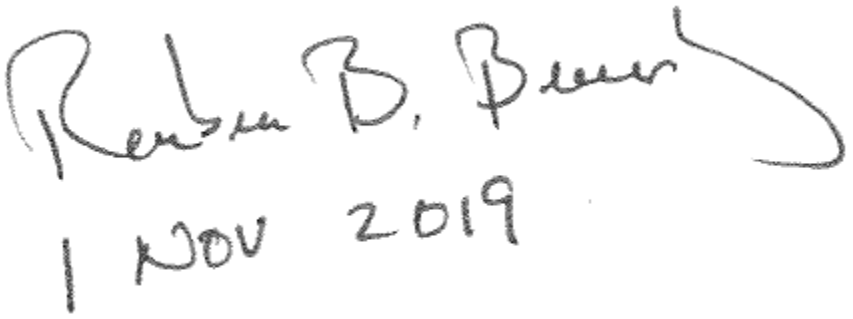
**On-Time Results Delivery**: 90%
**Quality of the Service Provided**: 100%
**Quality of the Test Provided**: 100%
**Compliance to Standards & Procedures**: 100%

**To have a competent work force**

Measurable through Training Records and Conformance to Training Need Analysis Plans/Recommendations

**Zero Incidents & Accident**

Measurable through Accident Reports



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