



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

Science and Ecosystem Support Division
980 College Station Road
Athens, Georgia 30605-2720

4 SESD

May 14, 2014

Ms. Elizabeth A. Dieck
South Carolina EQC
Director of Environmental Affairs
2600 Bull Street
Columbia, S.C. 29201

RECEIVED

MAY 19 2014

Administration
Environmental Quality Control

Dear Ms. Dieck:

Thank you for the Quality Management Plan for the South Carolina Department of Health and Environment Control (SCDHEC). This Plan was submitted in response to the QMP grant condition specified in 40 CFR Part 31.45 and EPA CIO 2105.0 (formerly Executive Order 5360.1, Revision A2), for environmental data and is part of the terms and conditions placed by Region 4 on all grants awarded to SCDHEC.

The QMP meets the agency's requirements and I have signed the document to indicate Region 4 approval. The QMP is valid for five (5) years unless a significant reorganization of SCDHEC occurs which would require revision of the document. If you have any questions or need additional information, please contact me at (706) 355-8708.

Sincerely,

A handwritten signature in blue ink that reads "Bobbi Carter".

Bobbi Carter
Quality Assurance Manager

Enclosures: 1



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South Carolina Department of Health
and Environmental Control

MAY 06 2014

OFFICE OF
QUALITY ASSURANCE

Quality Management Plan

South Carolina Department of Health and Environmental Control

Environmental Quality Control

**2600 Bull Street
Columbia, South Carolina 29201**

**March 2014
Version 1.0**



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1.0 **PROGRAM PLAN IDENTIFICATION FORM AND APPROVALS**

Document Title: Quality Management Plan for South Carolina Department of Health and Environmental Quality Control

Organization Title: S.C. Department of Health and Environmental Control

Address: 2600 Bull Street
Columbia, S.C. 29201

EQC Director of
Environmental Affairs: Elizabeth A. Dieck

State Quality Assurance
Management Officer (SQAMO): Sandra A. Flemming
P.O. Box 2202
Columbia, S.C. 29202

Plan Coverage:

This plan covers all monitoring and measurement activities mandated through the U.S Environmental Protection Agency (EPA) regulations and memoranda. This includes all internal and external environmental data generated by activities conducted throughout the South Carolina Department of Health and Environmental Control (DHEC or Department). In addition, the plan ensures that environmental technology used for pollution control or waste remediation are designed, constructed, and operated according to defined specifications and protocols.

1.1 Approvals

Name: Elizabeth A. Dieck

Title: Director of Environmental Affairs

Signature: Elizabeth A. Dieck Date: 4/28/14

Name: Bobbi Carter

Title: EPA Region 4 Quality Assurance Manager

Signature: Bobbi L Carter Date: 5/9/14

1.2 Concurrences

Myra Reece

Title: Chief, Bureau of Air Quality

Signature: Myra A Reece Date: 4-7-14

Renee Shealy

Title: Chief, Bureau of Environmental Health Services

Signature: Renee Shealy Date: 4-7-2014

Daphne Neel

Title: Chief, Bureau of Land and Waste Management

Signature: Daphne D Neel Date: 4/7/14

Carolyn Boltin-Kelly

Title: Chief, Division of Ocean and Coastal Resource Management

Signature: Carolyn Boltin-Kelly Date: 4/23/14

David Wilson

Title: Chief, Bureau of Water

Signature: David Wilson Date: 4-7-14

Sandra A. Flemming

Title: Assistant Bureau Chief, Bureau of Environmental Health Services

State Quality Assurance Management Officer

Signature: Sandra A. Flemming Date: 04-07-2014

1.3 Quality Assurance Liaisons

| | |
|----------------------------------------------------|----------------------|
| Bureau of Environmental Health Services | Nydia F. Burdick |
| Office of Environmental Laboratory Certification | Carol F. Smith |
| Analytical and Radiological Env. Services Division | Micheal Mattocks |
| Bureau of Air Quality: | Thomas Flynn |
| Bureau of Water | David Graves |
| Bureau of Land and Waste Management | Stephen Burdick |
| Ocean and Coastal Resource Management | Carolyn Boltin-Kelly |

2.0 INTRODUCTION

The U.S. EPA has developed a mandatory agency-wide quality system (or QA program) CIO 2105.0 (formerly Executive Order 5360.1A2), which requires the state to assure that:

1. Environmental data collected are of appropriate type and quality for their intended use.
2. Environmental technology used for pollution control or waste remediation is designed, constructed, and operated according to defined specifications and protocols.

The quality assurance requirements for state/tribal and local government financial assistance agreements are covered in 40 CFR Part 31.45 which states "...the grantee shall develop and implement quality assurance practices consisting of policies, procedures, specifications, standards, and documentation sufficient to produce data of quality adequate to meet project objectives and minimize loss of data due to out-of-control conditions or malfunctions."

The Department administers environmental programs and requires adherence with state and federal regulations that require environmental data to be of documented quality. The Quality Management Plan (QMP) is the document that describes how programs within DHEC will plan, implement, and assess the quality of environmental work to be performed as part of the various programs' function within the Department. The program areas involved are Air Quality, Water, Land and Waste Management, Environmental Health Services, and Ocean and Coastal Resource Management (OCRM). All programs are under the Director of Environmental Affairs. The QMP is the "blueprint" that defines DHEC's Quality Assurance (QA) policies and procedures; the criteria and areas of QA application; and the different QA related roles, responsibilities, and authorities of personnel.

DHEC's quality system is the means by which the Department implements the quality management process. The quality system encompasses a variety of technical and administrative elements which are contained in the QMP, such as: organizational structure, policies and procedures, responsibilities, authorities, required documents, and guidance documents.

3.0 DHEC QUALITY ASSURANCE POLICY AND OBJECTIVES

3.1 The Mission of DHEC

The DHEC serves the people of South Carolina as the authority, guardian and advocate in all matters relating to public health. The Department's definition of public health includes maintaining and promoting the full scope of environmental protection as well as personal health services that affect everyone's well being. The mission of the Department is to promote and protect the health of the public

and the environment.

3.2 The Importance of Environmental Data

Environmental data are critical to decision-making concerning the protection of the public and the environment from the adverse effects of pollutants produced by natural and man-made sources. Those sources include industrial discharges, air emissions, and waste operations as well as consumer waste. Environmental data are essential to decisions and actions pertaining to environmental protection efforts in the air, land, and all water bodies. The success of environmental technology in abating pollution or remediation of waste sites depends upon the design of technology, its construction and operation. Quality Assurance (QA) is the documentation of Quality Control (QC) and QC practices are needed to ensure that data involving all environmental efforts: pollution abatement, cleanup, public health protection, and environmental technology, are scientifically valid and defensible. This ensures that the correct decisions are made regarding any and all environmental efforts.

3.3 DHEC QA Plan

The quality assurance practice of the Department is that there be sufficient QA activities conducted to demonstrate that all environmental data generated, processed, or used will be scientifically valid, legally defensible, and of known and acceptable precision and accuracy. It is also the Department practice that documented precision and accuracy information be made available upon request for all reported data. Data shall be complete, representative, and comparable. The quality of all data generated by and for DHEC shall meet or exceed EPA requirements.

3.4 Objectives

The following are DHEC objectives which serve to support the QA plan:

1. The Data Quality Objective (DQO) process shall be used to plan project goals and objectives as they relate to needed environmental data quality prior to the initiation of data collection activities for non-routine sample collection.
2. The DQOs or similar outputs from a systematic planning process shall be documented in a Quality Assurance Project Plan (QAPP), or equivalent project planning document.
3. Special studies involving a potential public health threat or a criminal investigation may not have an approved QAPP due to a limited time frame for obtaining samples. These studies will be handled like routine work requiring adherence to applicable Standard Operating Procedures (SOPs).

Routine work is governed by regulation, programmatic QAPP or work plans and, therefore, individual plans are not necessary.

4. QAPPs or the equivalent planning documents shall be developed by those staff responsible for designing and implementing a project, study or task that requires the collection or use of environmental data. The document shall be approved by the SQAMO or designee. In addition, any laboratory that will be used for the study shall be consulted during the development of the QAPP to determine if the laboratory's analytical capabilities are commensurate with the project/study needs.
5. All laboratories used for the analysis of environmental samples shall be certified for all parameters for which they are submitting data (where certification exists by either EPA or the DHEC Office of Environmental Laboratory Certification Program).
6. Quality staff, technical staff, and management shall receive QA training appropriate for their job responsibilities.
7. Both internal and external assessments shall be performed to determine the effectiveness of the DHEC quality system.
8. QA processes shall be designed in the most cost effective manner without compromising data quality. Continuous improvement in the quality management system shall be emphasized.

4.0 **MANAGEMENT AND ORGANIZATION**

4.1 **Organization of DHEC**

The Department touches the life of every South Carolinian every day. From making sure that drinking water is clean to assuring immunizations are provided to the most vulnerable members of the population, the approximately 4000 full time employees provide services through state, regional, and county offices.

The South Carolina General Assembly created DHEC in 1973 when it reunited the State Board of Health and the Pollution Control Authority. The Department's Mission is to promote and protect the health of the public and the environment. The agency is divided into three areas: Administration, Environmental Affairs, and Public Health. This document will describe the quality management of Environmental Affairs. A description of the duties for the Bureaus of Business Management (BBM) and Information Technology (BIT), are also included in this document because they provide essential services to Environmental Affairs.

Charts or internet links to the charts depicting the Department's organizational structure are included in the appendix. Functions of each program area are listed

below. The quality assurance responsibilities of each bureau include the preparation of QA project plans for special studies and generic plans for all routine activities; the monitoring and overview of external environmental programs; and the preparation, review, and revision of standard operating procedures such as the SOP for sampling, entitled Environmental Quality Control Environmental Investigations Standard Operating Procedures and Quality Assurance Manual.

It is stressed by management and by the SQAMO that environmental data quality is the responsibility of all Environmental Affairs' staff who are directly or indirectly involved in sample collection and the generation of data. This includes, but is not limited to, project design, sample analysis, remedial design, grant administration, procurement, and business practices. The expectation is that employees shall conduct all business with integrity and in an ethical manner. Each staff member is held to the highest ethical standard of professional conduct in the performance of their duties. If unethical behavior is discovered it is reported to upper management. Senior management is responsible for ensuring that adequate resources are available to implement the quality assurance system. This includes resources for training and assessment so that applicable elements of the system are understood and implemented by staff.

4.2 Organization of Environmental Affairs

4.2.1 Administration

The Director of Environmental Affairs oversees the Division of Ocean and Coastal Resource Management, and the Bureaus of Air Quality, Environmental Health Services, Water, and Land and Waste Management.

4.2.2 Division of Ocean and Coastal Resource Management (OCRM)

OCRM is responsible for protecting the quality of the coastal environment while also promoting the sustainable economic development of the eight-county coastal zone for the benefit of all citizens of the state. To achieve these goals, OCRM implements of a robust coastal zone management program that regulates the development and limited use of coastal resources and engages stakeholders in long-term planning and coastal policy development initiatives. In addition to issuing project-specific permits, OCRM reviews and certifies other state and federal permits within the coastal zone through a comprehensive coastal zone consistency process. This effort strives to ensure that permitted activities have given full consideration to the protection of ecological, cultural, and historic values as well as the need for economic development. OCRM also provides tools and technical assistance to coastal municipalities and fosters collaborative resource management strategies through local

comprehensive beachfront management plans.

4.2.3 Bureau of Environmental Health Services

BEHS consists of EQC Regions and EQC Laboratories that include the Environmental Laboratory Certification Program.

4.2.3.1 EQC Regions

EQC Regions are responsible for implementing the various environmental quality control programs (Air, Water, and Land/Waste Management) throughout the state. Activities include inspection and sampling of drinking water systems; inspection of hazardous waste generation, treatment and storage facilities; approval of water and wastewater systems for operation; ambient sampling of the state's waters and air; inspection and sampling of wastewater treatment systems, inspection of domestic landfill operations; inspection of industrial air pollution facilities; inspection and approval of septic tanks; inspection of public swimming pools and bathing areas; inspection of construction sites for proper storm water and sediment control; sampling and classification of shellfish harvesting areas and inspection of processing facilities; sampling, inspection, and permitting of milk and dairy facilities; inspections and permitting of food facilities; investigation and sampling for potential rabies cases, response to oil chemical spills, radiological emergencies, or other environmental emergencies; investigation of complaints concerning the environment, including laboratory support.

4.2.3.2 EQC Laboratories

This area is composed of four entities: ARES (Analytical Radiological Environmental Services Division), Division of Air Quality Analysis (DAQA), Office of Environmental Laboratory Certification, and the regional laboratories. Samples range from milk and dairy products, water, and sediment to ambient air and radiological environmental monitoring. The testing and analyses conducted complement and support all EQC programs. DAQA in partnership with the Bureau of Air Quality (BAQ) maintains responsibility for the implementation of the ambient air monitoring program for the BAQ and analyzes the ambient air samples that are collected. The ARES and regional laboratories perform laboratory testing and analysis on water, sediment, and biological samples to determine if chemical and microbiological properties are consistent with quality standards. Also, ARES analyzes milk and dairy products. ARES supports activities in the regional

laboratories by establishing the SOPs used by the regional laboratories and providing technical consultation when necessary. The regional laboratories are listed below. The parameters for which the laboratories are currently certified are provided in Appendix B.

Upstate EQC (Anderson, Greenwood, and Walhalla Area): This area covers the counties of Abbeville, Anderson, Edgefield, Greenwood, Laurens McCormick, Oconee, and Saluda. The laboratories in this area are located in Anderson and Greenwood, SC. These labs perform only field analyses.

Upstate EQC (Greenville, Pickens, and Spartanburg Area): This area covers the counties of Cherokee, Greenville, Pickens, Spartanburg, and Union. The laboratories are located in Greenville and Spartanburg, SC. The Greenville lab performs laboratory and field analyses, while the Spartanburg lab performs only field analyses.

Midlands EQC (Columbia, Lancaster, and Rock Hill Area): This area covers the counties of Chester, Fairfield, Lancaster, Lexington, Newberry, Richland, and York. The laboratories in this area are located in Lancaster and Columbia, SC. The Lancaster laboratory performs laboratory and field analyses, while the Columbia laboratory performs only field analyses. The Columbia area laboratory is separate from ARES D.

Midlands EQC (Aiken Area): This area covers Aiken, Allendale, and Barnwell counties. The laboratory is located in Aiken, SC. The Aiken laboratory performs laboratory and field analyses.

Pee Dee EQC (Florence and Sumter Area): This area covers the counties of Chesterfield, Clarendon, Darlington, Dillon, Florence, Kershaw, Lee, Marion, Marlboro, and Sumter. The laboratories are located in Florence and Sumter, SC. The Florence lab performs laboratory and field analyses, while the Sumter laboratory performs only field analyses.

Pee Dee EQC (Myrtle Beach, Conway, and Williamsburg Area): This area covers the counties of Horry, Georgetown, and Williamsburg. The laboratory is located in Myrtle Beach, SC. This laboratory performs limited lab analyses as well as field analyses.

Low Country EQC (Charleston Area): This area covers Berkeley, Charleston, and Dorchester counties. The laboratory is

located in Charleston, SC. The Charleston laboratory performs laboratory and field analyses.

Low Country EQC (Beaufort and Orangeburg Area): This area covers Beaufort, Colleton, Hampton, Jasper, Orangeburg, Calhoun and Bamberg counties. The laboratory is located in Beaufort, SC. The Beaufort laboratory performs mostly microbiological lab analyses (including shellfish) and field analyses.

4.2.3.3 Office of Environmental Laboratory Certification

Office of Environmental Laboratory Certification is located organizationally within the BEHS. This area has the responsibility for administering the Environmental Laboratory Certification Program for all private, industrial, municipal, commercial, federal (for example, USAF Shaw AFB, USGS, and USN Nuclear Power Training) and state regional laboratories (except those certified by EPA Region 4) that produce data required by DHEC or that will be officially submitted to the Department. Certification is offered for the Safe Drinking Water Act, the Clean Water Act, RCRA, and other parameters as requested by the program areas. Lab Certification also certifies Shellfish Waters and Meats under the Food and Drug Administration (FDA) certification requirements.

4.2.3.4 State Quality Assurance Management Office or Officer

See Section 4.4.1 for more information.

4.2.4 Bureau of Air Quality

The BAQ is responsible for the implementation of the S.C. Pollution Control Act, the Asbestos Abatement License Act, and the Federal Clean Air Act for the purpose of maintaining standards and improving the air quality in South Carolina. The Bureau maintains the State Air Quality Implementation Plan that conforms to state and federal mandates. Activities of the Bureau include regulation development; air quality monitoring data analysis, and reporting; mobile source modeling for transportation conformity; compliance inspections of emission sources; enforcement actions taken to attain compliance with emission standards and permit requirements; licensing and oversight of asbestos removal and demolition projects, contractors and workers; permit issuance for emission sources; testing and evaluation of emissions; modeling of emissions prior to construction to ensure compliance with national air quality standards; accidental release prevention; and emission inventory. The DAQA, which includes the monitoring staff, is housed in the BEHS. This division

works in close partnership with BAQ. DAQA is responsible for the analysis of air quality samples and the ambient air monitoring network. BAQ is also assisted by regional personnel from the BES. Regional personnel collect ambient air samples for DAQA and perform compliance inspections.

4.2.5 Bureau of Water (BOW)

The BOW is responsible for assuring that waters of the state comply with state water quality standards for the protection of aquatic life and human health uses. The BOW ensures that public drinking water supplies are safe; public swimming pools and natural swimming areas are clean and safe; and restores and maintains the chemical, physical, and biological integrity of the state's waters to the degree that these water resources may be used to the maximum extent possible.

Activities of the bureau include reviewing plans and/or permit issuance for the construction and discharge of all proposed water, wastewater, storm water, and agricultural wastewater systems; inspection of such facilities under construction and in operation; reviewing applications for permits to construct/repair/alter/remove any dam regulated under the S.C. Dams and Reservoirs Safety Act and conducting on-going inspection programs for the dams; conducting routine monitoring for bacteriological, organic and inorganic chemical and radiological contamination; conducting biological assessments of natural waters of the state; coordinating activities to prevent the contamination of existing and potential underground sources of drinking water and improving the quality where health or environmental impact exists; establishing specific classifications for all streams and tributaries throughout the state and effluent standards and guidelines for wastewater discharges; developing and promulgating rules and regulations for pollution abatement and for public health regarding sanitation, processing and handling of shellfish, fish, crab meat, lobster and shrimp; initiating enforcement actions to abate any violations including assessment of appropriate civil penalties with reference to the State Safe Drinking Water Act, the State Primary Drinking Water Regulations, the S.C. Pollution Control Act, and the Water Pollution Control Permits Regulation.

ARESD and the regional environmental laboratories located within the BEHS work in partnership with the BOW. These laboratories are responsible for analyzing the water samples that are collected by field staff located in the regions.

4.2.6 Bureau of Land and Waste Management (BLWM)

The BLWM is responsible for ensuring the regulated management of all solid and hazardous waste in the state to protect the health and safety of the public and to protect the environment. Activities of BLWM include regulation, storage, transportation, treatment and disposal of hazardous and infectious waste to assure the safe and adequate management of these wastes.

BLWM maintains a fund to ensure financing for contingencies (including appropriate staff oversight of clean-up activities) arising from hazardous waste spills or accidents at permitted facilities or at pre-existing abandoned sites. The bureau also maintains reasonable enforcement standards to abate control and prevent pollution; regulates the methods of disposition of garbage and any like refuse matter; administers and implements the requirements of the S.C. Mining Act, which involves permitting all mining activities to ensure the environmental protection, public safety and reclamation of all lands and waters involved in mining within the State.

BLWM activities include enforcement actions, inspections, and permitting; promoting voluntary waste reduction through source reduction and recycling of industrial wastes; radioactive waste management; providing technical assistance to the Emergency Preparedness Division and the Governor in case of radiological emergencies. The sound use and protection of groundwater; waste assessment; and supervision of clean-up activities are responsibilities of BLWM. As part of this responsibility, the Underground Storage Tank Program has been designated as responsible for statewide compliance and corrective action programs related to underground storage tanks. Exact responsibilities are outlined in the State Underground Petroleum Environmental Response Bank (SUPERB) Act and Regulations 61-92 and 61-98. Specific compliance related services include: review and issuance of underground storage tank permit applications to install and operate; verification of tank owner's financial responsibility for corrective action and third party liability; maintenance of up to date information for all tank systems state wide; annual registration fee collection and decal issuance; oversight of installations, system upgrades, and abandonments; geotechnical services; and statewide inspection and outreach efforts.

BLWM utilizes BEHS regional staff to perform compliance inspections. Sampling, however, is done by BLWM staff or contractors. The BLWM uses commercial laboratories as well as internal laboratories for the analysis of samples.

4.3 Associated Bureaus

4.3.1 Bureau of Business Management (BBM)

BBM is responsible for providing the Department with supportive services in the following areas: procurement of goods and services; facility management; asset accounting and property management; central supply, mail and courier operations; motor vehicle management/ maintenance; facility maintenance; printing, photography and graphics; and security services. BBM maintains a continuous review of state and federal laws, policies and procedures to assist in the management process of the Department. In addition, BBM procures quality goods and services for all Department entities as requested by the various program area specifications in accordance with established rules and guidelines for procurement.

4.3.2 Bureau of Information Technology

BIT's role is to provide the technological leadership that both complements and enhances the Department's ability to accomplish its strategic plan. BIT is responsible for the management and development of all networks, both data and voice. The bureau constructs and implements, in cooperation with other deputy areas, common standards for technical systems, applications, and databases. BIT is also responsible for the development and implementation of programmed solutions that ensure integrity and security of departmental data.

4.4 Quality Assurance Program Management

Internal coordination of QA/QC activities among the various programs, divisions and bureaus located within DHEC is provided through several means:

Use of standard operating procedures for routine work: These are approved by management. In the case of analytical or sample collection activities these are also approved by the SQAMO or designee.

Use of QAPPs for non-routine work: All QAPPs must be approved by the SQAMO or designee. Some must also be approved by EPA (to be determined by the program area).

4.4.1 The SQAMO and the State Quality Assurance Office

The Assistant Bureau Chief (ABC) is given the responsibility over EQC Labs that includes Environmental Laboratory Certification. This ABC also serves as the SQAMO. The SQAMO oversees environmental monitoring throughout Environmental Affairs and routinely interacts with upper management. Because of the widely differing Program areas, the SQAMO relies on the QA liaisons as designees for the review of specific

programs and functions within those programs. For details on QA liaison roles, see 4.4.2.

The SQAMO or designee shall:

1. Be informed of each environmental monitoring study.
2. Ensure that the level of needed data quality will be determined and stated before the generation effort begins.
3. Be provided with a written study plan for special studies for approval. The SQAMO shall maintain a list of QAPPs submitted to the office with the date the QAPP was approved.
4. Ensure that all environmental samples collected and the data generated from them will be of the quality and integrity specified by the QAPPs.
5. Identify and respond to QA needs, resolve problems, and answer requests for guidance and assistance internal and external to the Department.
6. Ensure that all bureaus or offices are made aware of any program or SOPs that could affect their activities and responsibilities.
7. Ensure that all QA requirements are integrated into the overall State/EPA Cooperative Agreement/Grant Processes.
8. Communicate and disseminate information to all program areas, QA Liaisons, Project Officers, Bureau Chiefs, ABCs, and the EPA Regional Quality Assurance Manager.
9. Serve as the environmental monitoring clearinghouse in the preparation, approval, implementation, and revision of all QAPPs and SOPs.
10. Oversee the QA activities associated with special environmental studies. However, the program area requesting the activity has a designee(s) directly responsible for ensuring that the data quality objectives are met.
11. Attend quality assurance training courses.
12. Delegate peer reviews and other bureau specific QA tasks to the QA liaison.
13. Provide guidance and technical assistance to Department personnel on matters effecting data quality.
14. Work with Department staff to develop and maintain an acceptable QA program.
15. Resolve disputes regarding quality assurance issues within the Department and also with external data producers. (See Section 12.3)
16. Report QA concerns to the BEHS Bureau Chief, ABCs, and/or the Director of Environmental Affairs

In addition, a variety of quality assurance activities are used to administer the Department's QA program. The SQAMO or designee shall:

1. Perform technical system audits and data quality audits of Departmental programs and projects and recommending corrective actions when necessary. For the regional laboratories, these audits are also laboratory certification audits.
2. Perform field sampling audits and/or audits of field documentation.
3. Develop training programs for all levels of Departmental staff to ensure that QA requirements are understood and implemented.
4. Provide technical assistance to internal and external clients.

4.4.2 Quality Assurance Liaisons

Internal coordination of QA/QC activities can be difficult among organizations. Therefore, each program area with environmental monitoring responsibility shall designate a person as the QA liaison and a Project Officer. The presence of a QA liaison in the bureaus assists in coordination of QA activities, and helps the SQAMO ensure understanding and implementation of the quality system.

The QA Liaison shall:

1. Work with the SQAMO and other QA liaisons to coordinate QA/QC activities.
2. Identify and respond to QA needs, resolve problems, and answer requests for guidance or assistance.
3. Work with the bureau's staff to develop and maintain an acceptable QA program.
4. Be a peer reviewer for QAPPs generated by their bureau. However, in the case where there would be a conflict of interest (for example, the liaison is developing a QAPP or is the project manager), an alternate peer reviewer for the QAPP must be chosen. The liaison may delegate QAPP review to a colleague in his/her bureau that has the greater expertise, but this delegation must not cause a conflict of interest.
5. Work with the Environmental Laboratory Certification Program to ensure that laboratories generating data are certified for the applicable parameters and methods employed for the analysis and to ensure consistency among laboratory reporting requirements, quality control practices, etc.
6. Establish a standardized data reporting format for the specific program areas so that data packets are complete and easily reviewable.
7. Disseminate information regarding QA issues to their respective bureaus as well as bring issues to the table at the monitoring workgroup meetings or with the SQAMO.

4.4.3 Project Officer

Each project officer is responsible for specific internal (see section 5.1 for definition) environmental data collection projects, and is accountable for the management of the external (see section 5.2.4 for definition) data collection projects. Therefore, the project officer has the principal responsibility for ensuring that project data quality objectives are met.

Key responsibilities of the project officer are to:

1. Prepare and/or direct the preparation of QAPPs for special projects and submit the plans to SQAMO or designee for review and approval. Prepare or direct the preparation of QAPP updates and the distribution of the updates.
2. Prepare and/or approve the data quality objectives, specifications, and acceptance criteria for all special projects.
3. Oversee the quality of the data generated from external projects funded through financial assistance agreements as required.
4. Informally assess the adherence of all parties to the QAPP.
5. Participate in conducting QA system/performance audits of projects as requested by the SQAMO or designee.
6. Take corrective actions that may be required by audit findings and document the corrective actions.
7. Report data quality problems to the QA liaison and SQAMO or designee (if needed).
8. Attend QA training provided by the SQAMO or other appropriate external training as funding is available.

4.4.4 Technical Staff

Program managers and their staff are responsible for the daily implementation of the QMP. This includes organizing and planning activities to meet quality requirements consistently; coordinating work performance for specific projects; and training personnel through SOPs. All program area technical staff will assist the SQAMO or designee in their area of expertise as requested. This will enhance the QA capability of this plan.

The assistance may include, but not be limited to, the following:

1. Assist the SQAMO or designee with the technical aspects of QA as related to his/her expertise in air, water, chemical toxicity, toxic substances, hazardous waste, engineering, chemistry, biology, microbiology, field operations, and data operations.
2. Identify QA needs, resolve problems, and answer requests for guidance or assistance in his/her specific area of expertise.
3. Attend QA training provided by the SQAMO or other applicable external training as funding is available.

4.4.5 Contractors/Contracted Work

At times, the Department will use contractors for data collection through either sampling and/or analysis, or for analyzing samples collected by Department staff. If a QAPP exists for the work, the contractor must follow the conditions in the QAPP. If a QAPP does not exist, the contractor must develop a QAPP and submit it to the DHEC's SQAMO or designee for approval. All laboratories used by the contractor must be certified for the required parameters, methods, and analytes. Oversight of contractor work is provided by the QA liaison or by the project manager.

4.4.6 Environmental Laboratory Certification Program

The Department maintains an Environmental Laboratory Certification Program that operates according to R.61-81, State Environmental Laboratory Certification Regulations. The program certifies laboratories located in South Carolina as well as out-of-state laboratories that are performing analyses for regulatory reporting to the Department.

The responsibilities of the certification staff are to:

1. Conduct technical system audits at least every three years of the in-state laboratories and review technical system audits of out-of-state laboratories certified under an equivalent state certification program at least every three years. The audits are qualitative assessments of personnel, equipment, facilities, procedures, and QA activities. Provide quality assessments for laboratories generating data to the affected project managers and other interested parties upon request from the program areas.
2. Perform data quality audits in which data are reviewed and evaluated to determine the quality and usability of the data. These are performed at the request of the program areas or other parties of the Department.
3. Maintain a database that documents the certification status of all laboratories certified by the state's program. The database will include the certification status of parameters and test methods employed by the laboratory.
4. Inform the program areas and the public (upon request) of the certification status of laboratories generating environmental data.
5. Conduct the annual performance audits using the Water Supply Proficiency Testing (PT) Studies and Water Pollution PT Studies. The results for required performance audit testing are reviewed and follow-up assessments/audits or decertification actions are taken as required by regulation. Results of the performance audits are tracked for all laboratories certified by the office.
6. Inform the program areas, SQAMO, and laboratories of changes in regulations that affect certification requirements.

5.0 QUALITY SYSTEM COMPONENTS

5.1 Description of the Quality System

The Director of Environmental Affairs has the overall responsibility for the development, implementation, and continued operation of the Department's environmental quality system. To ensure that the Department's QA plan is uniformly applied to the generating and processing of all environmental data, the State Quality Assurance Management Office has been established (see Section 4.4.1). The BEHS ABC, responsible for the EQC Laboratories, shall serve as the SQAMO. In addition to the SQAMO, the Quality System utilizes QA liaisons for internal coordination of QA/QC activities throughout Environmental Affairs.

Planning, implementation, and assessment processes are necessary to effectively conduct environmental data collection operations and the use of evolving environmental technology. The elements of the Quality System include activities in the planning, implementation and assessment phases. The planning process is documented in QAPPs and work plans. During the implementation phase, samples are collected, analyzed and data received as per the planning document. This process is overseen by the data user and/or project manager/leader. The assessment phase is conducted as specified in the QAPP and other applicable planning or quality documents (the QMP, for instance). This discussion is a generalization. A more detailed discussion of individual components and tools for implementing the quality system are described below.

5.2 Quality Assurance System for Internal and External Data

5.2.1 Data used within Environmental Affairs

1. Internal analytical data generated by the Department's laboratories, field activities, and/or private laboratories as part of a QAPP or contract.
2. External analytical data generated in support of program grants, cooperative and interagency agreements, and by facilities in fulfillment of permit or regulatory requirements.
3. Data such as meteorological information, emissions profile, or standards recognized by national or regional organizations for specific purposes, such as air modeling.

All analytical data used in support of environmental decisions must be generated in a laboratory that is certified by the Environmental Laboratory Certification Program or by the EPA, where such certification exists. Analytical data from a laboratory not certified for the specific analysis that was reported will be considered as information only and will not be used

for decision making unless specified in the associated QAPP to be of appropriate quality for project objectives.

5.2.2 Internal Data

ARESD and DAQA are certified by EPA Region 4. The regional labs are certified through the Environmental Laboratory Certification Program. The generation and QA of routine data are described in associated SOPs and programmatic QAPPs.

The steps outlined in the Guidance Document for Preparing QAPPs for Monitoring Projects/Studies are to be used for planning and implementing environmental projects requiring departmental or internal non-routine data collection. This document describes a graded approach that allows an appropriately detailed Data Quality Objectives (DQO) process and QAPP appropriate for the scope of an internal project. Project officers for the programs will be responsible for preparing QA project plans for special projects. The SQAMO or designee will be available to assist in the development of these documents. The SQAMO or designee shall review and concur on plans for internal data generation prior to sample/data collection.

EQC's sampling manual is entitled Environmental Quality Control - Environmental Investigations Standard Operating Procedures and Quality Assurance Manual. This document is reviewed bi-annually, revisions are incorporated, and then disseminated to staff. Urgent changes may require immediate implementation and distribution. This will be handled via the Monitoring Workgroup Chairperson. It is unnecessary to review routine sample collection protocols included in a project QAPP, but the appropriate protocols and SOPs must be referenced. This document is for internal Department use, but portions may be provided to parties outside of DHEC with the permission of the SQAMO or through the Freedom of Information process. This will promote project implementation and data quality consistency.

When the Department enters into a cooperative agreement with another agency, the lead entity will be responsible for generating the QAPP, unless otherwise agreed upon. Elements as described in the current revision of the DHEC EQC Guidance Document for Preparing QAPPs for Monitoring Projects/Studies must be clearly outlined. Data quality objectives must be established to ensure the appropriate data quality is specified for the data collected. Although an external activity may not originate within this Department, a QAPP is necessary and should be completed in accordance with guidance documents and the Department's QMP at a minimum for the data generation or collection activities that are the responsibility of the Department. The complexity of QAPPs prepared for EPA Region 4 under

cooperative agreements, will be dictated by the individual programs. The QAPPs should be consistent with the requirements specified in the QA/R-5 document (and the upcoming EPA QA Handbook which contains the QA/R-2 and QA/R-5 documents for preparing QMPs and QAPPs).

5.2.3 Contract Labs and Interagency Agreements

Project managers shall ensure all requests for proposals (RFPs) for environmental sampling or analytical services contain a description of the QA requirements necessary to meet project objectives. The QA procedures must be established and clearly described. Any laboratory producing analytical data for a program's utilization must have SOPs available for review. The SOPs must contain the general elements as given in EPA QA/G-6 Guidance for the Preparation of Standard Operating Procedures, April 2007. These elements are listed in Section 5.3.4 of this document. The laboratory organization, structure, and areas of responsibility must be available for review by the program accepting the data. The laboratory must be certified by the EPA or the Environmental Laboratory Certification Program for all parameters, including parameters measured in the field, where such certification exists. Any laboratory that sub-contracts to another lab must ensure that the affected laboratory has the required certifications and will meet the data quality requirements of the project. Upon completion of the project, the project manager shall assess the data quality of the environmental monitoring activity. DHEC along with participating federal and state agencies must agree upon the QA requirements in project contracts and interagency agreements before environmental measurements or data collection activities begin.

5.2.4 External Data

Generally, analytical data generated by activities external to DHEC will be required to meet the same data quality requirements as internal activities. Project related SOPs for collection and analysis must be available and must contain the same general elements as required by the DHEC Environmental Laboratory Certification Program. These elements are listed in Section 5.3.4 of this document. Any laboratory generating monitoring data, etc. that are reported to the Department must have an established quality program appropriate for the expected data use. The laboratory must be certified for all parameters by either the EPA or the Environmental Laboratory Certification Program where such certification exists. Routine data generated by facilities that are required by permit, agreement, order, or regulation must be generated using approved methods and certified laboratories; or meet the requirements specified in an associated approved QAPP. DHEC may require QAPPs for non-routine monitoring requested by a facility. The data received must be in a format determined by the program area and must be of acceptable quality. Data

quality determination must be supported by Department or program examination of all related documents including SOPs, field records, sample handling, analytical records, and data review.

Supporting data used in program activities may include non-analytical or other data sources that are generally recognized or specified by a national or regional organization as appropriate for the intended use. Examples include historical and interpolated data used as boundary conditions or inputs to models and established typical emissions, discharges, or species profiles associated with a source type. National inventories of emissions and discharge recognized by the EPA or improved datasets based on those inventories, may be used in DHEC projects or data analysis. The source data and the process used to incorporate any changes to the source data must be specified in the QAPP, an associated SOP or project documentation.

5.3 Quality System Components

5.3.1 Planning

In order to conduct environmental data collection and associated environmental monitoring activities effectively, program planning, implementation, and assessment of the activities is necessary. Planning may involve any person in the Department from upper management to front line staff. It may also include stakeholders and others involved with internal and external projects. Development of project objectives and implementation should start with scoping meetings involving appropriate levels of management plus technical staff and stakeholders.

Additional information and resources are described in Section 10 of this document.

5.3.2 Data Quality Objectives

DQOs are qualitative and quantitative statements of the quality of data needed to support specific decisions or regulatory actions. DQO's should include statements about the level of accuracy required for the project data by outlining Method Detection Limits (MDLs), reporting limits, limits of quantitation (LOQ), etc. Detailed guidance for developing DQOs is provided in Guidance on Systematic Planning Using the DQO Process, EPA QA/G-4 dated February 2006.

Having identified the need for an environmental investigation, each project officer is responsible for initiating the DQO development process. During the early planning phase of the investigation, the project officer must clearly establish the intended use of the data generated. The DQO

process requires significant interaction between the project manager, field and laboratory technical staff, and data users. This is necessary because the project manager knows what is needed for the project, but may not know the capabilities of the laboratory. The laboratory must be informed of the requirements of the project, so that they can select the necessary methodology and instrumentation in order to meet project requirements. Familiarity with the methodology and the data quality elements associated with them is necessary in order for those elements to be included in the project plan. Field staff must be informed of the requirements for preserving samples and maintaining sample integrity. In turn, the DQOs will be used for the detailed design of the investigation and also in the preparation of the QAPP. The SQAMO or designee will be the contact for guidance and review of DQO development. Tracking DQO development and implementation will occur as a part of the QAPP review process. The DQO process is outlined in the QAPP Guide and is part of each QAPP.

It should be noted that the DQO process can be different for an investigative type study, where the goal is to find out simply what is present, rather than what decision must be made from the results of the study.

5.3.3 Quality System Documentation

5.3.3.1 Quality Management Plan

The DHEC QMP serves as the umbrella over all of the components listed below. At no time must any document or process under the QMP conflict with it. The components of the quality system (and the tools for implementing it) described below are to be used for planning projects requiring data collection.

5.3.3.2 Quality Assurance Project Plans

The EPA and DHEC require that all projects involving the generation, acquisition, and use of environmental data be planned and documented and have an approved QAPP prior to the start of data collection. The exceptions to this are routine work, situations involving immediate public health threats or situations involving a criminal investigation. For these exceptions a generic document (SOPs) outlining acceptable methods for sampling and analysis will suffice.

Although it is the goal to have an approved QAPP in place prior to any data generation, it is allowable, with authorization from the SQAMO or designee, to generate preliminary data to determine possible sampling sites or other needed information for the QAPP.

However, such data generation must consist of only one or two sampling events. The results of this sampling and how the results affected the study (sampling site locations, etc) should be discussed in the QAPP.

Special studies involving an immediate public health threat or a criminal investigation may not have a QAPP due to a limited time frame for obtaining samples. These studies will be handled in the same manner as routine work requiring adherence to applicable SOPs. Other special studies involving environmentally-related measurement activities conducted by or for EQC shall be performed with the approval of SQAMO or designee. Routine work such as, but not limited to, data reported in accordance with the National Pollutant Discharge Elimination System, shall be conducted in accordance with SOPs and do not require pre-approval by the SQAMO or designee. Refer to Appendix C for a detailed list of regulations utilized for the routine compliance work done by or for the Department.

The SQAMO or designee will ensure that:

1. The level of needed data quality will be determined and stated before the generation effort begins.
2. All environmental samples collected, processed, and data generated will be of the quality and integrity specified by QAPPs and/or SOPs.

To accomplish the above, each environmental monitoring organization shall develop and implement SOPs, approved by the SQAMO or designee, for all monitoring activities.

QAPPs, coupled with SOPs, define specific project QA/QC requirements. This approach identifies the parameters to be measured and discusses the QA activities to be conducted during sampling, analysis, and data validation stages of the project. The document entitled Requirements for Quality Assurance Project Plans, EPA QA/R-5, Final; March 2001 currently provides detailed instructions for preparing QA project plans.

In order to be effective, the QAPP must specify the level or degree of QA/QC needed for the particular environmental data operation. Because this will vary according to the purpose and type of work being done, DHEC will evaluate QA/QC applied to a project commensurate with:

1. Purpose of the environmental data collection.

2. Type of work to be performed.
3. The intended use of the data.

Each QAPP shall include procedures for assessing the quality of all environmental data generated and processed for accuracy, precision, completeness, comparability, and representativeness.

For more information regarding format and requirements for writing a QAPP, a document entitled The Guidance Document for Preparing Quality Assurance Project Plans (QAPPs) For Environmental Monitoring Projects/Studies has been published. The latest version of this document is available on the web at: http://www.DHEC.gov/environment/envserv/docs/OAPP_Guide%20Sept_2008_Finalflags.pdf

5.3.3.3 QAPP Approvals

All of the state's QAPPs must be approved by the SQAMO or designee prior to data collection. The SQAMO or designee shall review all plans, provide input, recommend changes, and approve final plans. Upon request, the QA liaisons or designated technical staff shall serve as peer reviewers for QAPPs with regard to their area of expertise. QA activities are to be tracked by the project officer.

None of the environmental data collection work addressed by the QAPP may be started until the initial QAPP has been approved by the DHEC sponsoring program and the SQAMO or designee (except as discussed in the beginning of this section). In some cases, DHEC may grant conditional or partial approval to permit some of the work to begin while non-critical deficiencies are being resolved. The SQAMO or designee should be consulted to determine the nature of the work that may continue and the type of work that may be performed under a conditionally approved QAPP.

The following approvals are granted:

1. Full Approval: No remaining identified deficiency exists in the QAPP and the project may commence.
2. Partial Approval: Some activities identified in the QAPP still contain critical deficiencies while other activities are acceptable. If the acceptable activities are not contingent upon the completion of the activities with deficiencies, a partial approval is granted for those activities to proceed.

Work should continue to resolve the portions of the QAPP that are deficient. The SQAMO or designee will ensure that all deficiencies are addressed and final approval is granted.

3. Conditional Approval: Approval of the QAPP or portions thereof will be granted upon agreement to implement specific conditions, specific language, etc. by parties required to approve the QAPP in order to expedite the initiation of field work. In most situations, the conditional approval is upgraded to final approval upon receipt, review, and sign off by all parties of the revised/additional QAPP pages.

Once approved, the organization performing the work is responsible for implementing the QAPP. This responsibility includes ensuring all personnel involved in the work have copies of or access to the approved QAPP along with all other necessary planning documents. Section A9 of the QAPP specifies how the approved QAPP will be disseminated to those on the distribution list in section A3. Personnel should understand their responsibilities prior to the start of data generation activities.

5.3.3.4 QAPP Revisions

Organizations are responsible for keeping the QAPP current when changes to technical aspects of the project change. QAPPs must be revised to incorporate such changes. Any revisions or additions to the QAPP must be re-approved by the program and the SQAMO or designee and distributed to all participants in the project. (See the Guidance for Preparing QAPPs).

5.3.3.5 SOPs for Labs and the Field

SOPs are compiled into a document that describes how the affected methods (EPA, Standard Methods, etc.) are to be routinely implemented. Although SOPs are usually written for field and laboratory procedures, an SOP is not necessarily limited for these work environments. Other areas within the Department may also have written SOPs. The format for the laboratory SOPs is given below, but a format for non-laboratory areas should be defined within that area or program. All SOPs from within that entity should adhere to that format.

Staff is expected to follow applicable procedures while conducting technical operations. Personnel may depart from existing written procedures on a project specific basis with approval from the division director and the SQAMO or designee. Such departures

must be documented so that the data user is aware of the change.

Laboratory and field SOPs should be routinely reviewed annually by the analyst and manager. However, in the event of a change to a procedure, the SOP must be updated prior to implementation of that change. Minimally, every time the document is changed the document control information must be updated to show the date of the last revision.

The SOPs involved with field sample collection and field analysis are compiled in The EQC Environmental Investigations Standard Operating Procedures and Quality Assurance Manual. It is produced by the Monitoring Workgroup and is housed by the SQAMO. Laboratory SOPs are generated within the laboratories by the analyst(s) and his/her manager. The director of the laboratory and SQAMO (or designee) review these SOPs.

5.3.3.6 Field Sampling/Analysis SOPs

SOPs for sampling must contain sampling design and methodology, general site selection, sampling equipment and cleaning requirements, and safety issues. SOPs for field sampling and field analysis must be written in accordance with associated regulations and the EQC Environmental Investigations Standard Operating Procedures and Quality Assurance Manual.

5.3.3.7 Analytical SOPs

Any analytical SOP contains information such as scope and application, method summary, safety procedures, interferences, sampling and storage, apparatus and materials, reagents and solvents, sample preparation and instrumental analysis protocols, calculations, analytical performance control requirements and documentation, and data reduction. Analytical SOPs are written/updated by the analyst(s) and his/her manager(s). Then the SOP is reviewed and signed by the manager, the director and the SQAMO or designee. Each time that a SOP is reviewed, the signature page must be resigned and dated to show the date of the review. Actual changes in the SOP will be indicated by the document control information, which will include the revision date.

The laboratory manual containing SOPs for analytical methodology used by EQC Laboratories must include the following information, as applicable:

1. Table(s) of organization.
2. The chain-of-custody procedures and a description of the associated forms.
3. The type of sample containers to be used.
4. The preservation that is required.
5. The volume of sample required to complete the analysis.
6. A summary of the holding times for all affected parameters.
7. The cleaning and preparation of containers.
8. The types of parameters requiring field or trip blanks.
9. Notebooks, workbooks or paperwork used internally for tracking sample analysis.
10. Data control recording notes (reported in the Lab Information Management System).
11. Use of significant figures and rounding scheme.
12. Reporting requirements for analytical results.
13. The lower limits of detection.
14. The sample and data management which includes form design, filing and storage.
15. Laboratory services, instrumentation, and equipment which involves laboratory pure water, preventative maintenance in the lab, and record keeping.
16. Glassware types, uses, and cleaning protocol.
17. Grades and quality of reagents, solvents, fuels, and compressed gases.
18. For each method used, a SOP must be available. SOPs must include data reduction and validation criteria to minimize data transcription and interpretation errors.
19. Special safety requirements will addressed in the SOP. General safety is discussed in the appropriate Safety Manual as a separate document.
20. A list of attachments included in the document.

All analytical (non-field) SOPs will include the following elements in the order specified. A general description of content material for each element is included as guidance. If an element is not applicable to that SOP, this should be stated in the SOP. Procedural steps must be numbered sequentially by subsection and step (for example: 1.1, 1.2, 1.2.1, and so on). All SOP pages must be identified at a minimum by section number, month/year, and page number. Formatting of page and page numbering is left to the discretion of the division or bureau. SOPs are reviewed by the director of that area and the SQAMO or designee prior to implementation. SOPs are reviewed at a minimum of every two years. Once the document is reviewed, the signature page is re-signed.

The organization and content for an approvable SOP is in Table 5 in Appendix E.

5.3.3.8 Program SOPs

SOPs are to be prepared by the various program areas as determined by the specific program needs. SOPs are to be reviewed by appropriate senior staff and by technical specialists in the specific work area(s). SOPs are dynamic documents, requiring revisions as determined by regulation, changes in equipment or protocol. EPA QA/G-6, Guidance for the Preparation of Standard Operating Procedures, April 2007 provides guidance for the preparation of SOPs.

The objectives of SOPs are:

1. To establish traceability of standards, reference materials, instrumentation, samples and environmental data;
2. To train a user who has the basic education and experience to properly use them;
3. To establish consistency with sound scientific/engineering principles;
4. To establish consistency with the EPA regulations and guidelines;
5. To establish consistency with an instrument manufacturer's specific instruction manual(s).

All QA programs and SOPs shall have a document control system to provide for periodic updating and to ensure that all affected personnel receive all revisions.

5.3.4 Data Processing, Verification, Validation and Data Handling

The Department utilizes both primary and secondary data. Primary data includes the internal and external data previously defined in section 5.2. Secondary data includes environmental data from other sources such as published literature, industry surveys, compilations from computerized data bases and information systems, and results from computerized or mathematical models of environmental processes and conditions. Data processing includes collection, validation, storage, transfer, and reduction. Precautions shall be taken each time the data are reduced, recorded, calculated, and transcribed to prevent the introduction of errors and the loss of information.

Data processing requirements are as follows:

1. Collection: Each field and laboratory SOP, as appropriate, shall address the checks which must be used to avoid errors in the data

- collection process.
2. Verification: This is the process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements. Data verification procedures are specified in the laboratory SOP manual and in QAPPs.
 3. Validation: Data validation is defined as “an analyte and sample specific process that extends the evaluation beyond method, procedural, or contractual compliance to determine the analytical quality of a data set.” Currently validation procedures are outlined only in QAPPs and performed on a very limited basis.
 4. Transfers: Each SOP, as appropriate, shall describe procedures which shall be used to ensure that data transfer is error-free, and that no information is lost in the transfer. Data transfers shall be kept to a minimum.
 5. Reduction: A SOP, as appropriate, shall contain procedures for ensuring and verifying the correctness of data reduction processes. Data reduction includes all processes which change either the form of expression or quantity of items. It is distinct from data transfer in that it entails a reduction in the size of the data set. Each SOP, as appropriate, must identify the processes used to obtain the reduced data set.
 6. Storage: Each program (as appropriate) shall either have a SOP or written plan indicating how specific types of data will be stored, and the duration of the storage. This is determined in accordance with Department and federal guidelines. For each stage of data processing at which data are stored, procedures shall be established to ensure data integrity and security.

5.3.5 Corrective Action

Each QAPP and SOP shall include provisions for written requirements establishing and maintaining QA reporting and feedback mechanisms to the appropriate program personnel to ensure that early and effective corrective action can be taken when data quality falls outside established data quality objectives (acceptance criteria). Each QAPP shall also include provisions to keep the SQAMO and program management staff informed of the performance of all data collection when corrective actions are necessary. Corrective action shall relate to the overall QA management scheme and shall specify not only who is responsible for implementing the corrective actions, but also who will be responsible for providing oversight to ensure that actions have been taken, and that these actions have produced the desired results.

5.3.6 Training

Training is an important component of the quality system. DHEC has a system for determining the training needs of the staff. Please refer to section 6 for more information.

5.3.7 Project and Data Assessments

Assessments of both full projects and actual data generated either routinely or through a project are also components of the Quality System. Tools used for these assessments are discussed in section 12.

6.0 **QUALIFICATIONS AND TRAINING**

6.1 Training Policy

Each program area will ensure that all personnel performing tasks and functions related to data quality will have the needed education, training, and experience. Minimum personnel requirements are established by the Office of Personnel Services. Any special preferences are determined by the hiring authority. Ensuring that personnel requirements have been met is the responsibility of the hiring authority.

6.2 General Qualifications and Training Requirements for EQC Staff

Once hired, every employee attends generalized training required by the Department. There could also be additional training determined by the job itself. For example, a laboratory staff member would need Hazard Communication; while a staff member that has field related duties may be required to take Confined Space Training. Some job duties entail training outside of DHEC. For instance, Environmental Laboratory Certification Program requires the successful completion of the Chemistry and Microbiology Drinking Water Certification Courses given by EPA.

The employee attends most required classes as soon as possible. However, there are situations in which the employee must obtain experience in the job prior to attendance of some classes. Immediate supervisors, along with the division directors, determine what job-related classes are needed for specific personnel. For continuous education/training, regional lab staff is required once a year to attend an update conference given by ARES and the SQAMO. EQC requires that both lab and field staff annually read the SOPs for which they are responsible to determine if revisions are necessary. This is an EPA requirement. The field staff's SOPs are located in the EQC Field Investigations SOP and QA Manual (EISOP). Upon receipt of the EISOP, staff must sign a form that indicates that they have read, understood, and will abide by the requirements in the EISOP. Lab staff also signs a form that indicates that they have read the SOPs. This is part of

the annual evaluation process.

The ARES Drinking Water laboratory is audited by EPA Region 4 every three years. In addition, EPA has included at least one regional laboratory in the last 2 audits. Staff demonstrates capability by successfully completing required Initial Demonstrations of Capability (IDOC) before analyzing and reporting samples.

6.3 Professional Licenses and Certification for DHEC Personnel

Positions which require professional licenses, certifications, or other formal qualifications in order to be compliant with the specification stipulated in state or federal statutes/regulations are limited to what is specified in the position description for the employee's job. For instance, a physician must have a license to practice in South Carolina, as must a registered nurse. A position, however, may be advertised with preferences such as professional geologist, but this will not eliminate persons without that certification.

The only exceptions are as follows:

1. Environmental Laboratory Certification: Laboratory Certification Officers (LCOs) are required to successfully complete the EPA's Drinking Water Certification courses for microbiology and chemistry. This certification can, however, be completed after on the job training.
2. The Shellfish Program: The Shellfish Program uses certified law enforcement officers for the patrol and enforcement components of the program. The law (SC Code of Law Section 44-1-151) makes violation of shellfish laws and regulations criminal acts. Enforcement for criminal acts (tickets, arrests, etc.) can only be performed by a certified law enforcement officer.
3. The Underground Storage Tank (UST) Program: The DHEC UST program is a certified site rehabilitation contractor (#UCC-0116) and the requirements stipulate registration as a professional engineer (P.E.) or professional geologist (P.G.) in South Carolina. Several UST program staff with SC P.G. certifications is listed in the contractor file. Staff is certified because of involvement in state lead investigations and Brownfield work. The position descriptions, however, do not require this certification, but the program ensures that a P.E. or P.G. certified staff member works as a site rehabilitation contractor.

6.4 The SQAMO Qualifications and Training

Besides the qualifications required for technical staff, the state quality assurance management office shall be staffed by professional personnel having the following qualifications at a minimum:

1. Knowledge gained through a combination of training and experience in a scientific discipline and knowledge of statistics.
2. Knowledge of appropriate federal laws, EPA regulations and guidelines

for environmental monitoring, and related EPA requirements.

3. Good written and oral communication skills in meeting and dealing with the general public, private industry, and officials of federal, state, and local governments.

6.5 Procedures for Determining QA Related Training Needs

Within EQC, managers, sometimes jointly with the SQAMO, shall determine the need for staff to attend QA related training. The immediate supervisor is responsible for ensuring that staff has obtained the required training. Training is obtained internally from the SQAMO and the information technology staff.

6.6 Documentation of Training

Training information on each employee in the Department is stored in the e-Learning Center (eLC). The system will hold the training records for each employee. The employee is able to sign up for training and has read only access to his own records.

In order to add a record to the eLC, documentation of training is given to the training coordinator for the administrative unit. The documentation can either be in the form of a hard copy certificate or an email from the course instructor. The training coordinator will be responsible for entering the information. For courses not given by the Department, the employee will be required to produce a certificate of training and an agenda of the course that was taken for the record to be included in the employee records.

6.7 Qualifications and training of non-DHEC personnel

The qualifications and training of personnel used by contracts, industry, etc. involved in environmental monitoring shall be evaluated through System and Performance Audits and through QAPPs submitted to the Department for review.

7.0 PROCUREMENT OF ITEMS AND SERVICES

All departmental grants, contracts, and cooperative or interagency agreements that generate environmental data must include requirements for the preparation of QAPPs and SOPs. The grant or contract officer is responsible for obtaining departmental approval of the QAPP from the SQAMO or designee before any data generation can be initiated. When a project is performed using total or partial US EPA funding, the affected program shall comply with state and federal regulations as listed in Section 4.5 of the QMP. The individual programs do not have their own QMPs but fall within this overall QMP.

There is a process to help ensure oversight. Within the bureaus, the process for ensuring that the procurement documents contain clear descriptions of the items and services

required, and for specifying the technical and QA/QC requirements for items and services is performed at the division director level or their designee(s). The individual (or group) reviews what is needed, writes a full description of what is required, and ensures the procurement documents contain the appropriate technical and QA/QC requirements prior to sending them through bid/quote process. For EQC, the assistant bureau chief approves the procurement request and for OCRM the approval comes from the division director. Should the total dollar amount of the item(s) be less than \$10,000, three written quotes are required. If the procurement exceeds \$10,000, a formal solicitation is created including non-restrictive specifications and is advertised for potential bidders to bid. The lowest responsible and responsive bid is accepted, if it is deemed most advantageous. The determination of responsibility and responsiveness of the quotes/bid is ascertained by the same individual(s) who wrote the description/specifications or by someone technically able to ensure that the bid meets all the requirements as stated in the solicitation. If the lowest quote/bid does not meet the requirements/specifications, this person prepares a written justification why the quote/bid should be rejected and sends this information to the procurement office. A formal determination of a non-responsive and/or non-responsible bidder is made by the procurement office and sent to the bidder.

Post award, the contractor must demonstrate compliance with work plans and QAPPs. This can be done via reports and/or meetings with the project manager. These reports and meetings help to assess that progress is being made and that the contractor is adhering to agreed QA/QC and other technical requirements.

The bid process begins with determining the qualifications and minimum criteria that would be acceptable, and, in most cases, be in compliance with DHEC and USEPA requirements. Each solicitation for bid contains the qualifications, minimum criteria and required scope of services for submitting a response. All contract bidders must submit a single data package that proves the bidder can perform the work required of each task bid. The evaluators, chosen to review the bids, are selected for their expertise. They evaluate each bid against the minimum criteria and rank each respondent accordingly. Usually, the highest ranked responsive and responsible contractor receives the contract/grant. The contract monitor (assigned to each contract/grant by area) keeps track of the contractor(s) and their ability to meet the requirements of the contract. The contract monitor must report quarterly to BBM on contractor compliance.

No analytical services should be accepted without verification of the laboratory's current certification status with the Department's Environmental Laboratory Certification Program. Laboratories must be certified for each parameter for which data will be provided to the Department, if certification exists for the parameter(s). Departmental staff should obtain technical assistance for SOP and QAPP preparation, analytical method selection or data quality problems from the QA liaison, Environmental Laboratory Certification Program, or SQAMO.

The purchase of field monitoring equipment, reagents, and laboratory instrumentation shall follow the requirements set forth in the approved QAPP and the purchasing requirements set forth by the South Carolina Consolidated Procurement Code. The

selection of a vendor is based on competitive cost, product performance, standardization on brand, and proximity to project location.

8.0 DOCUMENTS AND RECORDS

Quality-related documents that require control within EQC are SOPs, QAPPs, Quality or Technical Guidance Documents, and the QMP. Access to these documents is controlled by various means and can include items like:

1. Converting the documents to PDF;
2. Including revision numbers and/or dates on the documents;
3. Tracking changes on the documents by archiving earlier versions;
4. Including a record that documents the history of revisions (as is done with the SOPs). The revision history will indicate the changes made and who made them;
5. Computer files documenting where the quality document is housed or who has it.
6. Watermarks are used to document controlled documents versus uncontrolled.

The division director or SQAMO is responsible for identifying quality related documents and records in their area of EQC. These documents can range from guidance documents, to SOPs, to QAPPs, and also actual data. The division director, in consultation with the ABC, determines what sorts of controls are required for these documents. The ABC and division director are responsible for approving these documents. The SQAMO or designee must be an approving party for QAPPs and lab SOPs. Quality documents such as SOPs and guidance documents are controlled during electronic transmission by sending these documents only as PDFs. Access to the electronic versions of these documents is controlled by either password protecting the document or by limiting full access to only authorized personnel. Staff is provided copies of SOPs. They are watermarked as an uncontrolled copy.

SOPs and technical guidance documents are usually prepared by staff with the background and experience to do so. Quality related guidance documents usually come from the SQAMO. Technical guidance documents and SOPs are generated by the manager or designee in the lab or office for which they are being written. These are reviewed and approved by the division (or regional) director.

The SQAMO or designee reviews the SOPs, QAPPs and some, but not all technical guidance documents. The director's review includes a check to ensure that the method cited in the SOP conforms to federal regulations and that the SOP is in conformance with the cited method. When quality documents are taken out of service, replaced or revised, the older version of the document is archived electronically for the length of time that data is required to be stored. Hard copies of most of the documents are usually kept, but this is not required.

The laboratory SOPs are reviewed annually and the field SOPs are reviewed at a minimum of every two years. The signature page is re-signed to indicate that a review has been done. Revisions are indicated by the revision number and revision date. Generally, SOPs are only distributed within the Department and usually only to the

staff that will use them. Technical guidance documents and quality-related guidance documents are distributed outside of the Department. This can be done either electronically or by mailing hard copies. Guidance documents from the SQAMO or designee (including the QAPP Guide) are on the Department's website at:

<http://www.scdhec.gov/environment/behs/QualityAssurance/qaguidance.htm>

QAPPs are authored by the project manager or designee. Signatures of approval must include a signature from the lab(s) of record and the SQAMO or designee. This signature from the lab(s) indicates that the lab(s) has been consulted during the development process and that they agree with what is written in the QAPP regarding the affected methods, QC requirements and sampling handling. In the review of the QAPP, it is determined if the QAPP follows the correct format, is complete, that the methodology cited in the SOP conforms to federal regulations, that the data quality indicators(DQIs) are appropriate for the project, and that the laboratory to be used is certified by the DHEC Environmental Laboratory Certification Program or other recognized Accreditation Authority such as EPA, The National Voluntary Laboratory Accreditation Program (NVLAP), and the National Environmental Laboratory Accreditation Program (TNI) for the parameters they will be testing if certification exists. The organization(s) responsible for developing the QAPP is also responsible for keeping the QAPP current when changes to technical aspects of the project change. QAPPs must be revised to incorporate such changes. Any revisions or additions to the QAPP must be re-approved by the SQAMO or designee and distributed to all participants in the project as per the Guidance Document for Preparing Quality Assurance Project Plans (QAPPs) For Environmental Monitoring Projects/Studies.

Having complete documentation of a process, and ensuring that the work is complete and accurate whether it is field or laboratory work or in writing permits, plant inspections, or any work in the Department is critical. This is especially true when documentation is required by state and federal statutes. For many processes, training has to be included in order to ensure that staff understands what must be done to complete paperwork and to correctly do the work. Training varies depending on the process. Some examples of the types of training available include informal on the job training, online PowerPoint modules, periodic review of the SOP, and dedicated classroom training. Checks must be done on staff to ensure that records and documents produced accurately reflect completed work; this includes anything from the manager verifying the work to a formal audit.

In the case of a criminal investigation, an appendix in EQC's EISOP and QA Manual provides detailed information about how to proceed. First, a study plan is required. Following completion of the field activities, the project leader or designee must account for all field documentation, such as field logbooks, and chain-of-custody records, and verify that they are complete. When requested by the criminal investigator, all final analytical data from the lab must be documented in a memorandum stamped "CONFIDENTIAL", and transmitted to the project leader, technical support team, and criminal investigator.

Each bureau has assigned record keeping responsibilities in accordance with its functional responsibilities and duties. These responsibilities include what records and

documentation must be created and maintained as well as the security and integrity of the records (whether hardcopy or electronic) from their creation to their final disposal. The manner in which information is documented is mandated by the requirement that staff use approved DHEC forms. Each official DHEC form is reviewed by the forms committee and when approved, is assigned a unique number. Only then can the form be reproduced and used. These official forms are used in sample collection, field activity documentation, analysis request forms, laboratory analysis, and chain of custody. The use of official forms standardizes the documentation and this helps to ensure that documents are accurate, complete and legally defensible. Furthermore, managers are routinely required to review records and documentation produced by their staff.

Although retention schedules can vary in EQC, the records and information created, received, maintained, or acted upon shall be maintained in compliance with State Record Retention Schedules or EPA requirements, whichever is longer. Quality documents are not managed separately but are included in retention schedules in many bureaus. For special projects, the project officers shall be held responsible for ensuring that any project for which they are responsible (external or internal) adheres to their bureau's recordkeeping practices. DHEC employees leaving the Department must return all records to their manager prior to their severance from the Department. Electronic records and information held in electronic form and format shall be held in accordance with approved guidelines from BIT.

Files, records and information shall not be destroyed except in accordance with DHEC or State Record Retention Control Schedules and Procedures.

9.0 COMPUTER HARDWARE AND SOFTWARE

The Department is committed to following federal/state mandates regarding protection of data, and software/hardware requirements.

The Department's Chief Information Officer (CIO) manages the process of identifying management information technology (IT) needs and developing cost-effective management information systems and services to satisfy those needs. The CIO, the Director of Enterprise Applications, the Director of Technical Operations, and the Chief Information Security Officer (CISO) are responsible for the implementation of standard operating procedures and the identification of and prioritization of IT needs. Together they also evaluate proposed changes that may have the potential for cross-program impact.

The CIO, the CISO, and the directors coordinate their efforts with the appropriate Bureau of Information Technology section managers to identify and prioritize the Department's needs. The Bureau of Information Technology coordinates with the Department's Bureau of Business Management in procurement of software, hardware and/or services for IT projects. Depending on the cost of the project (greater than \$50,000), the State's CIO office within the Budget and Control Board may be involved in the approval process. The state IT approval process is completed by agency program staff and BIT

management and submits formal documentation of the background of the request, system/service requirements of the solution requested, options considered, risks and the estimated cost of the solution and an estimated timeframe to complete the scope of work.

All hardware and software solutions are evaluated prior to purchase and/or renewal using industry best practices, experience from other states and demonstrated performance. The Department adheres to all mandatory state procurement guidance to ensure the best price via appropriate market competition for the selected product or service.

The Department has recently consolidated all IT support staff into a single bureau. Within the Bureau of Information Technology is the Environmental Application Development Section, which includes all application development staff who was previously managed under the auspices of their previous individual environmental bureaus. Within the Environmental Application Development Section, a staff member has the designated role of coordinating efforts across the bureaus to improve data quality within the environmental deputyship. This staff member works with bureau staff assigned to a data quality team established to ensure the effectiveness and quality assurance of the information produced from or collected by our Environmental Facilities Information System (EFIS). EQC also works closely with EPA to ensure complete and accurate data is submitted through the Exchange Network Node System. The workgroup is currently improving cross program access to data, improving data extraction results and implementing improved public access to departmental information.

In the BIT, the assigned staff is responsible for maintaining the integrity of the computer databases and information systems for the agency. They ensure that the records are backed up routinely and that transfers from one area to another of electronic records are done accurately. BIT staff also ensures that virus protection is kept up to date on each computer in the agency.

Prior to data being input to computer databases, it is checked by the analyst and their supervisor. This review includes a check on the calculations and raw data. A percentage of data is checked by a third data verifier. Once the data is transferred to the program areas (the Bureau of Water – for example), that program area is responsible for the data integrity.

10.0 **PLANNING**

The document entitled Requirements for Quality Assurance Project Plans, EPA QA/R-5, Final; March 2001 provides detailed instructions for preparing QAPPs and is the critical document for the planning process. The Guidance Document for Preparing Quality Assurance Project Plans (QAPPs) For Environmental Monitoring Projects/Studies has been published to assist staff with QAPP development. This guide discusses QAPP development, QAPP approvals, revisions, evaluating data from other sources as well as the roles and responsibilities of parties involved in a project.

This revision of the QAPP Guide also discusses “scoping meetings” as a way of

beginning the planning process. The “scoping meetings” promote involvement with all parties involved with the project or impacted by the environmental problem that the project addresses. These meetings can include all or some of the following: laboratory staff, field collectors, management, Environmental Laboratory Certification Program personnel, stakeholders, and suppliers.

The purpose of scoping meetings is to determine:

1. Project goals;
2. Project milestones;
3. Project staff;
4. Regulatory requirements that will impact the project;
5. Environmental decisions to be made;
6. The identification of the type and quantity of data needed;
7. How, when, and where the data will be obtained;
8. Sampling design;
9. DQI requirements (including sensitivity requirements);
10. QA/QC and associated acceptance requirements;
11. Scope of the project covering boundaries of time, geography, and other items;
12. The existence and location of existing data and the quality of that data;
13. Who will write and who will maintain the QAPP.

All of the above will be incorporated in the QAPP. In addition, either the members of the scoping meetings or a designee will be responsible for formalizing the DQO process. Acquired data will be analyzed, evaluated and assessed according to the performance criteria given in a specific QAPP. However, this information is reviewed by the SQAMO or designee for conformance to state and federal regulations as well as the documented needs of the project.

The procedures for obtaining technical expertise for sampling, engineering design, risk assessment, QAPP preparation-review-approval, laboratory analysis, data validation and data quality assessment activities vary. However, the SQAMO is often the clearing house for many of these questions. When a question or problem is brought to the SQAMO, the office will use some or all of the following: the expertise of the QA Officers, research, QA liaisons and other technical staff, and EPA. In particular, the SQAMO houses the Department’s expertise for QAPP development and is responsible for review and approval of QAPPs prepared by internal or external organizations. In addition, technical expertise for sampling and design is planned through the use of field SOPs and scoping meetings for QAPPs. The technical experts are responsible for writing the SOPs and will be included in QAPP development.

Currently the SQAMO does not evaluate the effectiveness of the planning process as implemented by DHEC Staff. However, project managers are responsible for their individual projects as varying levels of management are responsible for the work their staff performs. This includes meetings with those involved with the project to address current problems as well as post-project meetings to assess project issues, corrective actions taken, and the application of these to future projects.

11.0 IMPLEMENTATION OF WORK PROCESSES

Routine repetitive work in the laboratory or field is a process requiring a SOP. Occasionally office work such as specific software applications may also require a SOP. Some special studies which do not require sample collection may require only a work plan and/or QAPP. Special studies involving environmental data generation through field and laboratory analysis not only require QAPPs, but SOPs and/or a work plan. Once SOPs, work plans, or QAPPs are approved, the work may begin. Occasionally the QAPPs and SOPs require a short "shake-down" period in order to ascertain if those quality documents have sufficiently dealt with problems and staff is able to handle unforeseen circumstances within the boundaries of what is being required. Revisions may be needed as a result of the shakedown process.

As discussed in the QAPP guidance document, the QAPP writer must distribute the approved QAPP to everyone listed in the distribution list in Section A3. This list is reviewed during the QAPP approval process for completeness to ensure that applicable parties such as stakeholders, lab staff, sampling staff, end data users and EPA are included. If revisions are necessary, then the revisions must first be approved by the SQAMO or designee and then the QAPP is redistributed to those on the distribution list. If the revision has major changes, then the entire QAPP must be redistributed. If there are only minor changes either the pages that have changed must be distributed, the changes are given as an addendum or the personnel are given a memo notifying them of the changes.

To ensure that staff has a proper understanding of what is required by a QAPP or SOP, each person involved must have access to a copy of the appropriate quality document. Within EQC, personnel routinely sign forms stating that they have read the SOP and agree to adhere to it. Some QAPPs also require the same from all personnel involved in the project. In addition, project managers and some designated bureau staff members will routinely review documentation and records as well as schedule visits of work sites. Environmental Laboratory Certification Program audits records and documentation of regional laboratories and field staff (see Section 12 also). This helps to ensure that the work is being performed according to the governing quality documents.

SOPs used by DHEC staff for collecting and analyzing environmental samples are routinely reviewed. The analyst is responsible for ensuring they have a copy of the most recent published revision of the SOP. SOPs are reviewed by the immediate supervisor. The manager is expected to ensure that the employee has implemented any changes dictated by an approved change in a SOP.

Both field (EISOP) and laboratory SOPs are internal. There are circumstances in which the EISOP must be released outside of DHEC due to a QAPP or other requirements. This is allowed if the SQAMO has approved the release of the information or via a Freedom of Information request. The portions of the EISOP sent out must include a disclaimer stating that the document is subject to "change without notice." The document

will include a watermark as an uncontrolled manuscript.

Withdrawal of procedures must include archiving the withdrawn SOPs and finished work plans. SOPs are rarely removed unless the methodology has been withdrawn or the specific instrument used has been retired. Withdrawal of a QAPP requires notifying the SQAMO in writing and includes the reasons for the withdrawal.

12.0 ASSESSMENT AND RESPONSE

The Department has numerous tools in place to identify the effectiveness of the quality system. One process for assessing the adequacy of the quality system is done through the annual assessment of time and effort expended in QA throughout EQC. The QMP work outputs will be reported to senior level management and the USEPA Region 4 by the SQAMO or designee. The annual QA report is sent to Marilyn Maycock. The report shall include a summary of work outputs achieved. This report will be issued annually in January of each year.

For the quality system to be effective, personnel within the system must adhere to quality documents such as QAPPs, SOPs, work plans, and technical guidance. Assessments are the principal means in this Department's QA program to determine the compliance with the established SOPs and QA study plans. Audits are essential to monitor the effectiveness and the efficiency of the QMP. Therefore, it is essential for auditors to have extensive background, experience, and training. Therefore an auditor is usually a senior chemist or lab manager. An auditor must not have a conflict of interest, direct involvement, or responsibility for any work being assessed. This however, does not preclude informal assessments by laboratory immediate supervisors and project managers who may assess personnel or projects to determine compliance with a QAPP or SOP. Audits are performed internally through a peer group process as well as regional lab management staff. Audits include lab certification evaluations.

A peer review process is underway to audit the environmental laboratories of the Department. Authority and sufficient access to all managers, personnel, and records has been granted in order to perform thorough internal audits. Both DAQA and ARES D are also audited by EPA. ARES D is certified under the SDWA by EPA Region 4, although Region 4 staff does review some CWA parameters. Except for Proficiency Testing these EPA audits are the only external audits. Recommendations will be made to improve the overall effectiveness of departmental programs. The audited programs will address findings in a response to the audit.

Whether internal or external, an audit accomplishes the following:

1. Defines and/or revises quality systems;
2. Verifies compliance with SOPs and the QAPP during the term of the project;
3. Identifies, prevents or remedies quality assurance problems;
4. Monitors the policies and procedures involved in data gathering, generation, review, and use;
5. Reviews the training effectiveness of the staff;

6. Determines program compliance with the quality system requirements;
7. Recommends activities to improve the overall effectiveness of departmental programs and;
8. Ensures that consistent policies are administered across organizational boundaries.

Informal assessments are routinely done by immediate supervisors in verifying work and provide general oversight of their section. In the event that corrective actions are needed, the corrective actions will be documented along with whether the actions were effective or not.

Assessors performing internal audits are senior level staff. For laboratory certification audits performed on satellite laboratories, the assessors must be recognized the EPA drinking water laboratory certification officers for the areas in which they are auditing. Laboratory Certification Officers' responsibilities are outlined by the EPA during the drinking water laboratory certification officers' training. Results of both internal and laboratory certification audits are reported to the laboratory director, regional director, the SQAMO, and the bureau chief for the Bureau of Environmental Health Services (BEHS).

Findings that identify deficiencies in the analytical, biological, radiological, or physical data generated within DHEC shall be communicated to the SQAMO and the program area. The program area is responsible for notifying end data users.

12.1 Types of Assessments

12.1.1 Performance Assessments

Performance assessments are quantitative assessments of the ability of an analytical system to obtain reliable data. These audits involve proficiency testing (PT) samples as unknowns obtained by laboratories or other analytical systems. These are annual assessments that are part of national proficiency testing programs such as EPA's Water Supply (WS) PT Studies, Water Pollution PT (WP) Studies, Discharge Monitoring Report (DMR) QA Studies, Radiological PT Studies, etc. The American Association for Laboratory Accreditation (A2LA) accredits suppliers. EQC utilizes national programs recognized by the EPA for PT sample providers. The results of PT studies are graded by the PT provider then made available to study participants and to the government organizations that have the responsibility for administering programs supported by the studies. The Department's EQC Laboratories, and drinking water and wastewater field staff currently participate in annual WS and WP PT studies.

Corrective action is tracked with a formal letter sent to the SQAMO and/or Laboratory Certification. This letter details the root cause and the corrective action taken. The effectiveness of the corrective action is

determined by the successful participation in a second performance assessment.

12.1.2 Technical System Audits (TSAs)

TSAs are internal and external on-site audits of environmental data gathering activities. The audits are qualitative assessments of personnel, equipment, facilities, procedures, and QA activities.

Internal audits of the ARES or DAQA laboratories are done as requested by the SQAMO. An external audit (also known as a performance audit inspection) of DHEC's central laboratory is conducted at three year intervals by the Region 4 US EPA Quality Assurance Section. Audits of the Department's regional laboratories are conducted by the Environmental Laboratory Certification Program at a minimum of every three years. Audits of external (non-DHEC) laboratories that provide data to the State of South Carolina are conducted by Laboratory Certification Officers within the state's Environmental Laboratory Certification Program. Certification audits do not exceed three year intervals. All certification audits shall be conducted according to standard documents such as The Manual for the Certification of Laboratories Analyzing Drinking Water, 5th Edition, January 2005.

Corrective action for a TSA consists of the following steps:

1. The party being assessed responds to the TSA report with a plan of corrective action.
2. The assessor reviews the response.
3. If required the assessor communicates where the corrective action plan is deficient.
4. Corrective action is closed out by the acceptance of the response and sometimes by documentation of compliance.

12.1.3 Data Quality Audits

These are quantitative audits in which data are reviewed and evaluated following collection to determine the quality and usability of the data. This type of audit may be performed by the Environmental Laboratory Certification Program or the respective project officer or personnel designated by the project officer to perform this data review. The data must be of acceptable quality as outlined in the laboratory QA manual and/or the DQOs of the QAPP. Data quality audits are performed during a Laboratory Certification Audit. The data quality audits are performed at least every three years as part of the certification renewal process. Other data quality audits are performed by the Laboratory Certification Program as requested by the Bureaus or as part of a QAPP. The Bureaus also perform data quality audits periodically to verify laboratory results

submitted for regulatory compliance data.

Corrective action for data quality audits consists of rejecting the data and reanalysis of the samples. Program areas are notified in writing concerning the rejection of the data.

12.1.4 Readiness Reviews

Prior to the beginning of a project, the project manager may elect to perform a readiness review. This can be something as simple as a checklist of items that must be in place prior to the beginning of a project, to as complex as a full “shake-down” period of time, documented in the QAPP, where project staff perform the work associated with the project. If problems are found during this period of time, then corrective actions are put into place. If the corrective actions support a change in a QAPP, then the QAPP must be revised as per the QAPP Guidance Document.

12.2 Audit Reports, Response and Corrective Actions

Results of these various audits will be reported to the appropriate Bureau Chief, ABC, Director, Project Officer, etc., with recommendations for corrective action. Alternatively, management can access the reports generated by Environmental Laboratory Certification Program through EFIS. Tracking of corrective action will be conducted in a number of ways (a response to an audit report, a mid-year review by the specific program area, or an annual review, for examples) and the results of this tracking reported to appropriate management. In any case, corrective actions should be made promptly. The Environmental Laboratory Certification Program typically gives thirty days for a response to a TSA. This response serves as documentation of the corrective actions taken and their effectiveness. The effectiveness of the corrective actions can also be assessed by scheduling of additional audits if necessary, by analysis of a single blind QC sample or by participation in additional PT studies.

12.2.1 Disputes

Where technical issues regarding QA/QC are in dispute, the resolution will be handled at the lowest administrative level possible. If the managers and staff cannot resolve a finding, the SQAMO will be consulted. In some situations it may be necessary for the SQAMO to consult with EPA Region 4. In the case of program issues, the SQAMO will communicate with the appropriate program personnel. For QA issues, the QA Section in Athens, Ga. will be contacted. The SQAMO is the final authority for resolving disputes resulting from assessments.

13.0 QUALITY IMPROVEMENT

13.1 Quality improvement is achieved by:

1. Anticipating problems and moving to prevent them;
2. Identifying problems quickly and determining the nature and extent of the problem;
3. Correction of problems as soon as practical, by implementing the appropriate corrective actions and actions to prevent further occurrences;
4. Documentation of all corrective action(s);
5. Tracking corrective and preventative actions to closure;
6. Promoting open communication among staff at all levels;
7. Promoting excellent customer service by improving communication between staff and their customers (internal or external) so that the customer's needs are understood;
8. Improving communication between the Department's suppliers in order to meet the needs of the Department for defensible data, identify process improvement opportunities and identify and offer solutions to problems.

13.2 Addressing Quality Problems

Identifying quality problems and improving performance are key components of our quality improvement efforts. The implementation of QA liaisons helps to ensure that conditions adverse to quality are either prevented or identified quickly. The SQAMO and the QA liaisons are responsible for responding to and resolving quality assurance problems and needs, and have oversight over improvement activities.

To ensure a continuous quality system, the Department:

1. Conducts routine internal and external audits of its program activities;
2. Initiates corrective actions to mitigate adverse conditions that compromise quality;
3. Promotes problem solving and process improvement activities and suggestions;
4. Encourages input and feedback throughout the planning, implementation, and evaluation processes by all staff and customers;
5. Promotes tracking and documentation of corrective actions.

13.3 Communication

Effective communication is essential to assure the success of a quality system. DHEC is committed to maintaining open communication in all aspects of planning, implementing, and evaluating its environmental programs. This is accomplished by:

1. The exchanging of information between the SQAMO or designee, management, QA liaisons, project officers, technical staff, and EPA/federal staff and state agencies/departments;

2. The interaction of the QA liaisons is outlined in section 4.4.2. The QA liaisons are responsible for disseminating information through SOPs, guidance documents, directives, policies, and procedures;
3. The meetings conducted by bureau and interdepartmental committees, teams, taskforces, and workgroups;
4. Program training initiatives, workshops, meetings, telecommunication, and e-mail.

13.4 Tracking the Quality System

13.4.1 Quality Management Plan

The QMP shall be kept current and revised as necessary. The QMP is to be revised on a five year basis, at a minimum.

13.4.2 Annual Report/Work Plan

The SQAMO or designee shall report QA implementation problems and progress to management. By October 31st of each calendar year, each environmental monitoring program shall submit a QA report to the SQAMO or designee. The SQAMO or designee shall submit a QA report to the EPA's quality assurance officer.

QA reports shall contain at a minimum the following information:

1. Status of QA program;
2. Status of standard operating procedures;
3. Data quality assessments performed to include both internal and external assessments;
4. QA program resources;
5. Performance audit results for the EQC Environmental Laboratories;
6. Summary of QA related training received and provided;
7. Summary of the significant QA related problems and the associated corrective actions, plan(s) and the progress of on-going corrective actions, if any;
8. Recommendations.

13.5 Ensuring Quality

In order to ensure that conditions adverse to quality are prevented, identified promptly, and corrected as soon as possible the following processes/procedures are used:

1. Review of data by a second analyst or the manager;
2. Review of data by the data users - particularly if the data is external;
3. Review of SOPs, procedures and data by the SQAMO;
4. Meetings with staff to determine the extent of the problem;

5. Workgroups to find solutions to the problems;
6. Discussions with technical experts to solve problems.

Constant review of the work and work processes help to quickly identify conditions that would cause decreased data quality. Workgroups, meeting, and the help of the experts help to identify the complete problem and provide solutions so that the problem is quickly and effectively handled.

14.0 LABORATORY COMPETENCY

Laboratory competency is assured by the following:

1. Certification by US EPA for the Drinking Water program. This includes audits on a triennial basis.
2. Certification of satellite laboratories by the DHEC Office of Environmental Laboratory Certification. This certification includes not only drinking water, but parameters under the CWA and Hazardous Waste.
3. Participation in annual PT studies for both the SDWA and the CWA.
4. Participation of all field analysts in the PT studies listed for item #3. Each satellite laboratory selects a single analyst to be the "reporter". This person's results are reported for the study. All other field analysts independently analyze the PT sample. These results are documented by the Lab Director. If an analyst fails this, corrective action is taken and second unknown will be analyzed to demonstrate competency.
5. Staff review SOPs on an annual basis.
6. Internal audits are performed by senior staff.

15.0 REFERENCES

US EPA. (2008). *US EPA Quality Policy CIO 2106.0*. Retrieved from <http://www.epa.gov/irmpoli8/policies/21060.pdf>

US EPA. (2001). *EPA Requirements for Quality Management Plans EPA QA/R2*. Retrieved from <http://www.epa.gov/quality/qs-docs/r2-final.pdf>

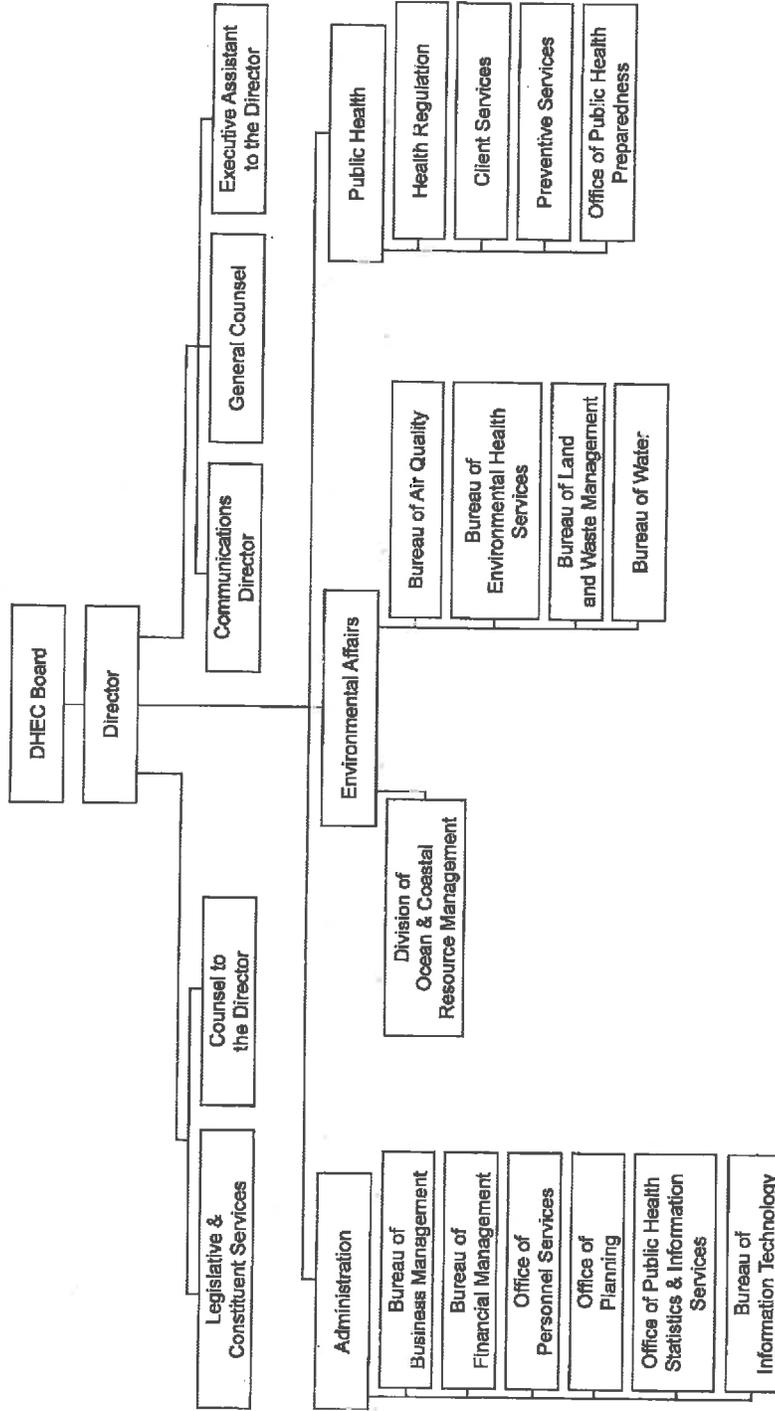
US EPA. (2002). *Guidance for Quality Assurance Project Plans QA/ G-5*. Retrieved from <http://www.epa.gov/quality/qs-docs/g5-final.pdf>

Guidance Document for Preparing Quality Assurance Project Plans (2008). Retrieved from http://www.DHEC.gov/environment/behs/QualityAssurance/docs/OAPP_Guide%20Sept_2008_Finalflags.pdf

16.0 Appendices

Appendix A-Organizational Chart

Director's Office Organization Chart



Appendix B- Regional Laboratory Certification - January 2014

Note: The lists below are subject to change. For current certification contact Carol Smith in Environmental Laboratory Certification.

| Lab | Anderson | Greenwood | Spartanburg | Columbia | Sumter | Orangeburg | Myrtle Beach |
|-------------|----------|-----------|-------------|----------|--------|------------|--------------|
| SM 4500HB | X | X | X | X | X | X | X |
| SM 4500CI G | X | X | X | X | X | X | X |
| SM 2550B | X | X | X | X | X | X | X |
| Colisure | | | | | | | X |
| SM9223B | | | | | | | X |

Table 1 Field Laboratory Certification under the SDWA

| Lab | Anderson | Greenwood | Spartanburg | Columbia | Sumter | Orangeburg | Myrtle B |
|--------------|----------|-----------|-------------|----------|--------|------------|----------|
| SM 4500 O G | X | X | X | X | X | X | |
| SM 4500 H B | X | X | X | X | X | X | X |
| SM 4500 CI G | X | X | X | X | X | X | X |
| SM 2550 B | X | X | X | X | X | X | X |
| SM 2510 B | | | | X | | | |
| Enterolert | | | | | | | X |

Table 2 Full Laboratory Certification under the SDWA

| Lab | Greenville | Lancaster | Florence | Aiken | Charleston | Beaufort |
|-------------|------------|-----------|----------|-------|------------|----------|
| SM 2320B | X | X | X | X | X | |
| SM 4500H B | X | X | X | X | X | X |
| SM 4500CI G | X | X | X | X | X | X |
| SM 2550B | X | X | X | X | X | X |
| EPA 180.1 | X | X | X | X | X | |
| Simplex | X | X | X | X | X | X |
| SM9215B | | X | X | X | X | X |
| Colisure | X | X | X | X | X | X |
| SM9223B | X | X | X | X | X | X |
| SM 9221D | | X | X | | | |
| SM 9221F | | X | X | | | |

Table 3 Field Laboratory Certification under the CWA

| Lab | Greenville | Lancaster | Florence | Aiken | Charleston | Beaufort |
|-----------------|------------|-----------|----------|-------|------------|----------|
| SM 4500 O G | X | X | X | X | X | X |
| SM 5210 B BOD | X | X | X | X | X | |
| SM 5210 B CBOD | | | X | X | X | |
| SM 2320B | X | X | X | X | X | |
| SM 4500 H B | X | X | X | X | X | X |
| SM 2510 B | | | X | | X | X |
| EPA 420.1 | X | | | X | X | |
| SM 4500 Cl G | X | X | X | X | X | X |
| SM 2550 B | X | X | X | X | X | X |
| EPA 180.1 | X | X | X | X | X | |
| SM 2540 D | X | X | X | X | X | |
| SM 2540 G | | | X | X | | |
| SM 9223 B | X | X | X | X | X | X |
| Enterolert | | | X | | X | X |
| SM 9221 C E | X | | X | X | X | X |
| Colilert 18 ATP | | X | X | X | X | |

Table 4 Full Laboratory Certification under the CWA

Appendix C- Federal and State Statutes and Regulations

Below is an extensive list by bureau of federal and state statutes and regulations that the Department adheres to for compliance monitoring and data collection activities:

Agency-Wide Regulations

1. SC Code Title 1, Chapter 23, State Department Rule Making and Adjudication of Contested Cases
2. S.C. Consolidated Procurement Code and Regulations, S.C. Reg. 11-35
3. State Procurement Regulations, S.C. Reg. 19-445.2000 thru 19-446.1000

OCRM

1. Federal Coastal Zone Management Act (1972)
2. 15 CFR Part 930, Federal Consistency with Approved Coastal Management Programs (2007)
3. 40 CFR Part 230, Compensatory Mitigation for Losses of Aquatic Resources (2008)
4. S. C. Statute 48-39-10 et seq., Coastal Tidelands and Wetlands Act (1977)
5. Specific Project Standards for Tidelands and Coastal Waters, S.C. Reg. 30-12
6. Specific Project Standards for Beaches and the Beach/Dune System, S.C. Reg. 30-13 through 18
7. South Carolina Coastal Zone Management Program Document

BAQ

1. 40 CFR Parts 60 – 76
2. 40 CFR Parts 50, 53, and 58 (Ambient Monitoring)
3. Federal Clean Air Act (as amended, 1990)
4. S.C. Pollution Control Act (1976)
5. S.C. Pollution Control Act (1976)
6. SC Code Title 48, Chapter 1, Pollution Control Act
7. S.C. Reg. 61-62 “Air Pollution Control Regulations and Standards”
8. Emergency Planning Community Right to Know Act
9. 40 CFR Part 93, Transportation Conformity
10. 40CFR Part 51, SIP Requirements
11. 40 CFR Part 52, Approval and Promulgation of Implementation Plans, Subpart PP - South Carolina
12. 40 CFR 96, NOX Budget Trading Programs And CAIR NOX and SO2
13. Trading Programs for State Implementation Plans
14. SC Code of Laws, Title 44, Chapter 87, Asbestos Abatement License

BOW

1. Federal Underground Injection Control Regulations, 40 CFR 144-146
2. 40 CFR, Parts 141 and 142 Safe Drinking Water Act as amended 1996 (State Primary Drinking Water Regulations)
3. Federal Clean Water Act (1977)

4. State Pollution Control Act (1976)
5. 40 CFR, Part 136 (1995)
6. Federal Underground Injection Control Regulations, 40 CFR 144-146
7. The Groundwater Use and Reporting Act (Chapter 5 of Title 49, Section 49-5-10 et. seq. of the 1976 Code as amended)
8. State Pollution Control Act (1976)
9. Dams and Reservoirs Safety Act [49-11-10]
10. Environmental Protection Fund Act [48-2-10]
11. Environmental Audit Privilege Act [48-57-10]
12. Groundwater Use and Reporting Act [49-5-10]
13. Pollution Control Act
14. Shellfish [44-1-140 (5) - 44-151]
15. State Recreational Waters Act (see sections 44-55-2310 through 44-55-2390)
16. State Safe Drinking Water Act [44-55-10]
17. Storm water Management and Sediment Reduction Act [48-14-10]
18. Water Quality Revolving Fund Authority Act [48-5-10]
19. Water, Water Resources and Drainage [49-1-10]
20. South Carolina Surface Water Withdrawal, Permitting, Use and Reporting Act [49-4-10]
21. Water Quality Certification (61-101)
22. Standards for the Permitting of Agricultural Animal Facilities (61-43)
23. Water Pollution Control Permits - (NPDES rules for Concentrated Animal Feeding Operations (CAFO) are contained in this Regulation) (61-9)
24. Classified Waters (61-69)
25. Water Classifications and Standards (61-68)
26. Dams and Reservoirs Safety Regulations (72-1)
27. State Primary Drinking Water Regulation (61-58)
28. Environmental Protection Fees (61-30)
29. Groundwater Use and Reporting (61-113)
30. Permits for Construction in Navigable Waters (19-450)
31. Water Pollution Control Permits (61-9)
32. Public Swimming Pools (61-51)
33. Natural Public Swimming Areas (61-50)
34. SC Individual Residential Well & Irrigation Well Permitting (61-44)
35. Well Standards (61-71)
36. Crabmeat (61-49)
37. Shellfish (61-47)
38. Water Pollution Control Permits (61-9)
39. Erosion and Sediment Reduction and Storm water Management (72-101)
40. Standards for Storm water Management and Sediment Reduction (72-300)
41. Standards for Storm water Management and Sediment Reduction (72-405)
42. Surface Water Withdrawal, Permitting, Use and Reporting (61-119)
43. Total Maximum Daily Loads for Pollutants in Water (61-110)
44. Underground Injection Control Regulations (61-87)
45. Water Pollution Control Permits (61-9)
46. Standards for Wastewater Facility Construction (61-67)

47. Proper Closeout of Wastewater Treatment Facilities (61-82)

BLWM

1. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986;
2. The Solid Waste Disposal Act as Amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA); the Safe Drinking Water Act Amendments of 1986; and SARA of 1986;
3. 40 CFR Parts 260-270 Resource Conservation and Recovery Act (RCRA)
4. S.C. Hazardous Waste Management Act (S.C. Code Ann. 44-56) Article 4 (sections 44-56-410 - 44-56- 495 were significantly revamped) Changes were effective 05-21-2013
5. S.C. Oil and Gas Exploration, Drilling, Transportation and Production Act (S.C. Code Ann. 48-43)
6. S.C. Mining Act (S.C. Code Ann. 48-20) (fee changes only)
7. S.C. Mining Act Regulations (R.89-10 thru 350)
8. S.C. Hazardous Waste Management Regulations (R.69-79)
9. S.C. Solid Waste Policy and Management Act (S.C. Code Ann. 44-96)
10. S.C. Solid Waste Management Regulations (R.61-107, et al)
11. New Regulation R.61-107.19 Solid Waste Management (2008) streamlined and replaced the following 4 regulations:
 - R.61-107.11 Construction and Demolition and Land clearing debris landfills
 - R.61-107.13 Municipal Solid Waste Incinerator Ash Landfills
 - R.61-107.16 Industrial Solid Waste Landfills
 - R.61-107.258 Solid Waste Management: Solid Waste Landfills and Structural Fill
12. Regulation R.61-107.17 Demonstration of Need
13. S.C. Oil and Gas Exploration, Drilling, and Production Regulations (R.121-8)
14. Infectious Waste Management Act (S.C. Code Ann. 44-93)
15. Infectious Waste Management Regulations (R.61-105)
16. 40 CFR, Parts 280-281
17. S.C UST Regulations (R.61-92, Part 280) Promulgated Pursuant to S.C. Code Ann. 44-2-50 (Supp. 1997)
18. State Underground Petroleum Environmental Response Bank Act S.C. Code Ann. 44-2-10 et seq. (Supp. 1997)
19. State Underground Petroleum Environmental Response Bank (SUPERB) Site Rehabilitation and Fund Access Regulations R. 61-98 Promulgated Pursuant to S.C. Code Ann. 44-2-50 (Supp. 1997)
20. SC Pollution Control Act (S.C. Pollution Control Act (S.C. Code Ann. 48-1)
21. S.C. Well Standards and Regulations (R.61-71, et al).

BEHS

1. S.C. Reg. 61-81 (State Environmental Laboratory Certification Program).
2. In addition, most of the regulations that govern the other bureaus are also

applicable since samples submitted/collected to the Labs (on the part of the other bureaus in EQC) are often compliance related.

3. S.C. Reg. 61-34 (Regulations Governing Milk and Milk Products).
4. S.C. Reg. 61-25 (Retail Food Establishments)
5. S.C. Reg. 61-32 (Soft Drinks and Water Bottling Plants)
6. S.C. Reg. 61-35 (Imitation Milk, Imitation Milk Products, and Products Made in Semblance of Milk and Milk Products)
7. S.C. Reg. 61-36 (Frozen Dessert Plants)
8. S.C. Reg. 61-54 (Wholesale Commercial Ice Manufacturing)
9. Rabies Control Act (S.C. Code Section 47-5-10)

Appendix D- Acronyms and Definitions

-A-

ABC Assistant Bureau Chief
ARESD Analytical Radiological Environmental Services Division

-B-

BAQ Bureau of Air Quality
BEHS Bureau of Environmental Health Services
BBM Bureau of Business Management
BIS Bureau of Information Services
BLWM Bureau of Land and Waste Management
BOW Bureau of Water
Project Officer Individual responsible for writing or coordinating efforts to write QAPPs.

-C-

CIO Chief Information Officer
CWA Clean Water Act

-D-

DAQA Division of Air Quality Analysis
DQI Data Quality Indicator, examples would be precision, accuracy, sensitivity, comparability, and representativeness.
DQO Data Quality Objective – A systematic planning system designed to produce qualitative and quantitative statements that clarify project objectives and define the appropriate type of environmental data and specify tolerable levels of decision error.

-E-

EQC Environmental Quality Control
EFIS Environmental Facilities Information System - the computer database that houses facility/lab information (addresses, contacts, owners), permit, and certification information.
EISOP Environmental Investigations SOP and QA Manual
Environmental Affairs Organizationally includes EQC and OCRM

-I-

IT Information Technology – computers - hardware, software

-L-

LCO Laboratory Certification Officer
LIMS Laboratory Information Management System- this is the computer system that tracks samples and houses their

analytical results and provides lab reports.

| | |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MDL | -M- Method Detection Limit - this is a measurement of sensitivity of the instrument/method used |
| OCRM | -O- Ocean and Coastal Resource Management |
| PT | -P- (Proficiency Testing) – Blind study samples obtained from an external vendor. These are needed by a laboratory to show proficiency for an analysis and to maintain certification. These are annual assessments that are part of the national proficiency testing programs such as the Water Supply PT Studies, Water Pollution PT Studies, DMR QA Studies, Radiological PT Studies, etc. |
| Program Manager | One who manages projects and staff to ensure that goals are met, project deadlines are achieved, and overall program effectiveness is assessed and retooled as necessary. |
| QAPP QMP | -Q- Quality Assurance Project Plan Quality Management Plan |
| SDWA DHEC | -S- Safe Drinking Water Act South Carolina Department of Health or Environmental Control (aka “the Department”) |
| SQAMO | State Quality Assurance Management Officer or their designee |
| TSA | -T- Technical Systems Audit - TSAs are internal and external on-site audits of environmental data gathering activities. |

Appendix E- Analytical SOP Format

| Element | Contents |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Title Page</i> | SOP title, SOP number or designation, review date, signatures of the Reviewer, Director and QA Officer. This page is re-signed with every review. |
| <i>1.0 Scope and Application</i> | Identify analyte(s), matrices, applicable concentration and applicable detection limit. |
| <i>2.0 Summary of Method</i> | Describe the analytical process and technology needed. |
| <i>3.0 Interferences</i> | Describe interferences and treatment to reduce them. |
| <i>4.0 Safety</i> | Include any safety precautions and warnings needed. |
| <i>5.0 Equipment and Supplies</i> | Instruments, apparatus materials required. |
| <i>6.0 Reagents and Standards</i> | Preparation guidelines for each standard/reagent made (including standardization instructions), specifics for use, etc. |
| <i>7.0 Sample Collection, Preservation and Storage</i> | Describe appropriate collection, preservation and storage of sample including holding times where relevant. Please note that care must be taken to ensure that agreement is maintained between laboratory and field SOPs on matters of preservation and hold times. |
| <i>8.0 Performance Criteria and Quality Assurance</i> | Include QC Checks required, frequency, acceptance criteria, and corrective actions for out of control data. |
| <i>9.0 Calibration</i> | Describe calibration procedures for all instruments and the frequency of the calibration including continuing calibration checks, if applicable. |
| <i>10.0 Procedure</i> | List sequential steps for sample preparation and analysis—this can include repeated information from the calibration if this makes the sequential steps more easily understood. |
| <i>11.0 Calculations and Data Reporting</i> | Describe data acquisition, data reduction, and reporting. |
| <i>12.0 Waste Management</i> | Describe protocols for treatment of hazardous waste generated by the analysis, and proper disposal guidelines or appropriate SOP reference. |
| <i>13.0 References</i> | List method reference. There should be only 1 reference, but if more than one reference is used then each reference must contain information that details what each reference is used for in the SOP. For instance an EPA and Lachat methods are listed. The EPA method is used for everything but the automated analysis. The Lachat method is used for the set up of automated analysis. |
| <i>14.0 Tables, Diagrams, Flowcharts, etc</i> | Attach as appropriate. |
| <i>Letters from EPA</i> | Any letter concerning the SOP sent by EPA allowing a change in the method must be included with the SOP. |

Table 5: SOP Format for EQC Laboratory Analytical Procedures