A1 TITLE

Ambient Surface Water Quality Monitoring Program Quality Assurance Project Plan

South Carolina Department of Environmental Services

Revision Version 0

SC DEPARTMENT of ENVIRONMENTAL SERVICES

David Chestnut

May 2026

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A2 APPROVALS

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Revision History		
Title	Revision No.	Effective Date
SCDES Ambient Surface Water Quality Monitoring Program Quality Assurance Project Plan	0.0	5/1/2026

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A4 PROJECT PURPOSE, PROBLEM DEFINITION, & BACKGROUND

The purpose of the South Carolina Department of Environmental Services (SCDES) statewide Ambient Surface Water Physical, Chemical, Microbiological, & Algal Discrete Monitoring Program is to collect basic water quality data to serve a variety of the Department's needs. This program has operated continuously since before the 1970s. Therefore this represents a programmatic Quality Assurance Project Plan (QAPP) documenting the collection of data intended to achieve the goals of the South Carolina Pollution Control Act (PCA), the federal Clean Water Act (CWA), and implement applicable State and Federal regulations. "Ambient monitoring" refers to monitoring of the general surrounding environment. This QAPP documents the ongoing routine physical, chemical, chlorophyll-*a*, cyanotoxin, and microbiological monitoring component of the overall SCDES routine surface water quality monitoring program (SCDES State of South Carolina Monitoring Strategy, Technical Report 003-2025 and SCDES Annual Monitoring Workplan). The §319 Nonpoint Source grants program State match monitoring requirements are also covered by this Programmatic QAPP.

This program falls under the SCDES Quality Management Plan, Revision 0, July 2025.

Data generated through the described activities are utilized by multiple Department programs as they meet those program's requirements. Resulting data are used in part in determining water quality standards attainment for the CWA reporting requirements for §303(d), §305(b) and §314, State match monitoring requirements for §319 Nonpoint Source grants, identifying causes and sources of water quality impairments, establishing, reviewing, and revising water quality standards, developing National Pollutant Discharge Elimination System (NPDES) permit limits, calculation of Total Maximum Daily Loads (TMDL) for specific waterbodies and Wasteload Allocations (WLA) for point source discharges.

Each program that makes use of these resulting data does so to support their specific program requirements.

The resulting data are also made publicly available for secondary use by anyone.

A5 PROJECT TASK DESCRIPTION

The purpose of the South Carolina Department of Environmental Services (SCDES) statewide Ambient Surface Water Physical, Chemical, Microbiological, & Algal Discrete Monitoring Program is to provide a system of monitoring sites that are sampled in a way that produces well defined data reflecting physical and chemical conditions of the streams, reservoirs, and saltwaters in South Carolina. The data collected serve a variety of the Department's needs. This program has operated continuously since before the 1970s. It does not address any specific problem or answer any specific questions. It produces no specific reports or products beyond the data generated.

The purpose of this program is the collection and generation of water quality data for general surveillance monitoring of ambient water quality conditions of surface waters of the State of South Carolina or to provide general water quality data at the request of other specific SCDES program areas.

- Collect water samples
- Analyze water samples
- QA analytical results
- Make results available to SCDES programs and public

For more information consult the SCDES State of State of South Carolina Monitoring Strategy, Technical Report 003-2025 and for specific scheduling details see the annual State of South Carolina Monitoring Workplan updates.

The monitoring design for the Ambient Surface Water Quality Monitoring Program is developed by members of the Aquatic Resource Monitoring Section of the Aquatic Science Division of the SCDES Bureau of Water. For additional details consult the SCDES State of State of South Carolina Monitoring Strategy, Technical Report 003-2025.

Monitoring is done year-round on an ongoing basis. Details in scheduling for the different monitoring design components can be found in Section B1.

There are currently two primary components of the Surface Water Physical, Chemical, Microbiological, & Algal Discrete Monitoring Program, including ongoing fixed-location monitoring and statewide statistical survey monitoring; each is designed to provide data for water quality assessment of major water resource types at different spatial and temporal scales.

A secondary component are Special Request Sites. Special Request Sites are temporary fixed-location sites that target locations of special interest to the Department related to specific data needs.

A6 INFORMATION/DATA QUALITY OBJECTIVES AND PERFORMANCE/ACCEPTANCE CRITERIA

Data Quality Objectives (DQOs) and Data Quality Indicators

The SCDES Ambient Surface Water Quality Monitoring Program is a long-term, statewide initiative designed to collect standardized water quality data from streams, reservoirs, and saltwaters across South Carolina. The data produced by the program are made publicly available via the Water Quality Portal and support a wide range of environmental and regulatory needs by providing consistent, scientifically valid data to internal and external stakeholders.

Although the program itself does not interpret or apply the data, the information generated is used by multiple Department programs to meet their specific objectives. These include, but are not limited to:

- Assessing attainment of water quality standards for Clean Water Act (CWA) §303(d), §305(b), and §314 reporting;
- Supporting §319 Nonpoint Source grant match monitoring requirements;
- Identifying causes and sources of water quality impairments;
- Establishing, reviewing, and revising water quality standards;
- Developing NPDES permit limits;
- Calculating Total Maximum Daily Loads (TMDLs) and Wasteload Allocations (WLAs).

Data Quality Objectives

The primary objective of the Ambient Surface Water Quality Monitoring Program is to collect environmental data that are:

- Scientifically valid and technically defensible;
- Of known and acceptable precision, accuracy, and sensitivity;
- Representative of ambient conditions across time and space;
- Comparable across sites and sampling events;
- Complete to the extent feasible under routine monitoring conditions.

These objectives ensure that the data are suitable for a wide range of potential end uses, even though the program itself does not define specific applications.

Performance and Acceptance Criteria

Performance criteria are based on adherence to EPA-approved methods (40 CFR Parts 136, 141, and 143), SCDES Standard Operating Procedures (SOPs), and laboratory QA/QC protocols. All samples are analyzed by the SCDES Bureau of Regional and Laboratory Services (BRLS) or the Aquatic Science Division (ASD) Laboratory.

The Ambient Surface Water Quality Monitoring Program is an ongoing monitoring program rather than a discrete project with a defined endpoint. As such, there is no pre-established

number of required samples, and missed samples are not rescheduled. Instead, sampling continues according to the established schedule and resumes at any site once conditions become acceptable. There is no fixed completeness threshold; however, data quality is maintained through consistent adherence to the monitoring strategy and all data are qualified in the Laboratory Information Management System (LIMS) as appropriate.

The following DQIs are used to evaluate whether the data meet the program's quality objectives:

DQI	Definition	Determination Methodologies
Precision	Agreement among repeated measurements under similar conditions.	Field duplicates, lab duplicates, and/or split samples.
Bias	Systematic error that skews results in one direction.	Use of blanks, spikes, and certified reference materials.
Accuracy	Agreement between a measured value and a known true value.	Percent recovery from spiked samples of reference materials.
Representativeness	Degree to which data reflect actual environmental conditions.	Adherence to monitoring design and field SOPs.
Comparability	Confidence that the data can be compared across time, space, or datasets.	Consistent methods, QA/QC, protocols, and data qualifiers.
Completeness	Proportion of valid data obtained versus expected.	Comparison of valid results to planned sampling; missed samples are not rescheduled.
Sensitivity	Ability to detect low concentrations of analytes.	Method detection and reporting limits defined by EPA-approved methods.

All analytical results represent new data and are produced by the same laboratories using consistent methods, ensuring comparability and reliability. Calibration and verification criteria for field measurements are provided in Table 3.

More information relative to DQOs can be found in the SCDES State of South Carolina Monitoring Strategy, Technical Report 003-2025.

Table 1. Assessment Decision Rules

Parameter	Parameter Range	Null Hypothesis	Tolerable Limit	Consequence of Decision Error	Corrective Action	Gray Region	Probability Value
Chemical	Most current South Carolina Regulation 61-68 Water Classifications and Standards Most current South Carolina Regulation 61-69 Classified Waters	Waterbody does not exceed criteria	For conven-tional pollutants 90% of data points fall within criteria For potentially toxic pollutants no more than 2 samples exceed appropriate chronic or acute criteria	Place on §303(d) list erroneously	Additional data are collected and assessment revised. Waters removed from the §303(d) list	Macro-invertebrate data indicates aquatic life use is fully supported and chemical data exceed criteria	Aquatic life use support decision is based on macro-invertebrate results
Bacterio-logical	Most current South Carolina Regulation 61-68 Water Classifications and Standards	Waterbody does not exceed criteria	90% of data points fall within criteria or guidelines	Place on §303(d) list erroneously	Additional data are collected and assessment revised. Waters removed from the §303(d) list		Support decision is based on criteria and approved assessment methodology

Table 2. Routine Ambient Surface Water Quality Monitoring Parameters, Analytical Methods, Reporting Limits, and Reporting Units

Analysis Name	DES Routine Sampling Frequency	DES Lab Method for Ambient Surface Water Monitoring	DES Reporting Limit	Reporting Units	LFB QC Limits (%)
Field Data					
Depth of Sample Collection m	Monthly			m	
Air Temperature °C	Monthly			°C	
Water Temperature °C	Monthly			°C	
Field Dissolved Oxygen mg/L	Monthly			mg/L	
Field pH SU	Monthly			SU	
Additional Saltwater Field Parameters					
Specific Conductance umhos/cm	Monthly			umhos/cm	
Salinity ppt	Monthly			ppt	
Lake Sites					
Chlorophyll-a ug/L (Corrected) ug/L	Monthly May-Oct.	EPA Method 445.0	0.025	ug/L	
Microcystin	Monthly May-Oct.	Abraxis ADDA and SAES	0.150 0.05	ug/L	
Secchi Depth m	Monthly			m	
General Parameters					
Turbidity - NTU	Monthly	EPA 180.1	0.50	NTU	90-110%
5 Day BOD Streams mg/L	Monthly	SM 5210 B	2.0	mg/L	Drift Check ±0.20 mg/L
Alkalinity mg/L	Monthly	SM 2320B	1.0	mg/L	90-110%
Ammonia as N mg/L	Monthly	FIALab 100	0.050	mg/L	85-122%
Total Kjeldahl Nitrogen in Water as N mg/L	Monthly	QuikChem 10-107-06-2-H [1]Transitioning to FIALab 100	0.10	mg/L	90-110%
Nitrate/Nitrite as N mg/L	Monthly	QuikChem 10-107-04-1-C [1]Transitioning to SM 4500NO3-F	0.020	mg/L	90-110%
Total Phosphorus as P in Water mg/L	Monthly	QuikChem 10-115-01-1-E [1]Transitioning to SM 4500P-H	0.020	mg/L	90-110%

Analysis Name	DES Routine Sampling Frequency	DES Lab Method for Ambient Surface Water Monitoring	DES Reporting Limit	Reporting Units	LFB QC Limits (%)
Cadmium in Water mg/L	Quarterly	EPA 200.8	0.0001	mg/L	85-115%
Chromium in Water mg/L	Quarterly	EPA 200.7	0.0050	mg/L	85-115%
Copper in Water mg/L	Quarterly	EPA 200.7	0.010	mg/L	85-115%
Iron in Water mg/L	Quarterly	EPA 200.7	0.020	mg/L	85-115%
Lead in Water mg/L	Quarterly	EPA 200.8	0.002	mg/L	85-115%
Manganese in Water mg/L	Quarterly	EPA 200.7	0.010	mg/L	85-115%
Nickel in Water mg/L	Quarterly	EPA 200.7	0.010	mg/L	85-115%
Zinc in Water mg/L	Quarterly	EPA 200.7	0.010	mg/L	85-115%
Mercury in Water mg/L	Quarterly	SM 3112B	0.00020	mg/L	85-115%
Freshwater stream samples whenever metals are collected					
Total Suspended Solids mg/L	Quarterly	SM 2540D	1.0	mg/L	90-110%
Freshwater samples whenever metals are collected					
Hardness, calculated mg/L	Quarterly	EPA 200.7	1.0	mg/L	85-115%
Freshwater Bacterial Indicator					
E. coli Bacteria by Quanti-Tray MPN/100 mL	Monthly	SM 9223B	1	MPN/100 mL	N/A
Saltwater Only					
Enterococci Bacteria by Quanti-Tray MPN/100 mL	Monthly	ENTEROLERT	10	MPN/100 mL	N/A

[1]These parameters are under transition to new instrumentation and methods. The projected completion is by the end of 2026.

The individual SOP sections detailing the analysis for the Routine Ambient Surface Water Quality Monitoring Parameters are provided in Table 6.

Table 3. Bureau of Water Calibration Verification Criteria

(source: SOP for Continuous Monitoring of Ambient Water)

Parameter	USGS Calibration Verification Criteria (Open-File Report 2014-1151)	BOW Calibration Verification Criteria
Temperature	± 0.2 ºC	Secondary confirmation with NIST thermometer at least once during field season. ± 0.1 °C
Specific Conductance	± 5 umhos/cm or ±3 % of the measured value, whichever is greater	±10%
Dissolved oxygen	± 0.3 mg/L	± 0.2 mg/L
pH	± 0.2 pH unit	± 0.2 unit
Turbidity	± 0.5 NTU or ± 5% of the measured value, whichever is greater	± 10%
Phycocyanin	± 0.5% of the expected value	± 10%
Chlorophyll *a*	± 0.5% of the expected value	± 10%

A7 DISTRIBUTION LIST

Distribution List

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The distribution list for this QAPP is not exhaustive of all parties affiliated with the program. The list includes representatives from the BOW Aquatic Science Division (ASD) responsible for maintaining the QAPP, BOW and BRLS Bureau Chiefs and Assistant Bureau Chiefs, Deputy Director overseeing BRLS, QAM, and representatives from Santee Cooper, South Carolina Department of Natural Resources, and EPA Region 4. The listed individuals will be responsible for distributing the approved QAPP to their respective teams. The QAPP is also publicly available on the SCDES webpage.

A8 PROJECT ORGANIZATION

- **Senior Manager** - As the BOW Bureau Chief, Ann Clark is the Senior Manager of the Ambient Surface Water Quality Monitoring Program effectuated by this QAPP and reports to the Deputy Director of Environmental Programs (Henry Porter). The Senior Manager defers all program logistics to the Project Operations Manager and BOW/BRLS staff.
- **Project Operations manager** - David Chestnut is the Project Operations Manager and will distribute and maintain the QAPP. The Project Operations Manager is responsible for coordinating program logistics and is the primary point of contact for most program-oriented logistics.
- **Project QAM** - Paul Miller is the Project Quality Assurance Manager (QAM) and will review and approve the QAPP on behalf of the Deputy Director of Environmental Affairs (Jennifer Hughes, Deputy Director). The QAM is outside of the BOW and BRLS and is independent of all project and field operations. The QAM's responsibility is to ensure the QAPP meets agency standards and to support the Project Operations Manager.

BRLS management (Travis Fuss, Micheal Mattocks, and Chris Corley) and Analytical and Radiological Environmental Services Division (ARESD) Director (Susan Jackson) will ensure that all elements of field sampling and laboratory analysis are conducted in accordance with the QAPP.

Chad Holbrook of Santee Cooper will ensure that all elements of field sampling and laboratory analysis for sites within their designated water resources are conducted in accordance with the QAPP. Santee Cooper representatives communicate directly with the Project Operations Manager.

Denise Sanger of the South Carolina Department of Natural Resources (SCDNR) will ensure that all elements of their respective field sampling and laboratory analysis for sites associated with the South Carolina Estuarine and Coastal Assessment Program (SCECAP) are conducted in accordance with the QAPP. SCDNR representatives communicate directly with the Project Operations Manager. SCECAP is described in Section B1.

Chris McArthur and Stephanie McCarthy, or designee, will approve the QAPP on behalf of EPA Region 4.

SCDES Project Organization - Supporting Information

The following section provides additional information related to the high-level project organization described above.

The South Carolina Environmental Laboratory Certification Program is authorized by Regulation 61-81 which became effective on January 1, 1981. The Regulation applies to all laboratories which generate data for compliance with state environmental regulations or that is performing any other analyses related to environmental quality evaluations required by the Department or which will be officially submitted to the Department.

Santee Cooper Public Service Authority conducts their own monitoring program, and they collaborate with the SCDES Ambient Surface Water Quality Monitoring Program to collect certain monitoring data at certain sites at the request of SCDES. The Santee Cooper laboratory is certified under the South Carolina Environmental Laboratory Certification Program for all of the data they collect at the request of SCDES, as well as the data resulting from their own monitoring program.

Data generated through the described activities serve the needs of multiple Department programs. Resulting data are used in part in determining water quality standards attainment for the CWA reporting requirements for §303(d), §305(b) and §314, identifying causes and sources of water quality impairments, establishing, reviewing, and revising water quality standards, developing National Pollutant Discharge Elimination System (NPDES) permit limits, calculation of Total Maximum Daily Loads (TMDL) for specific waterbodies and Wasteload Allocations (WLA) for point source discharges. The resulting data are also made publicly available for secondary use by everyone.

The ABC of the BRLS Laboratories, along with the Division Director of ARESD, and the QAAs coordinate the internal ARESD quality assurance program. The laboratory quality assurance program encompasses every aspect of the laboratory analysis from container preparation through the actual data release from ARESD to the Environmental Programs.

ARESD has three quality control manuals which detail the day-to-day operation of the quality assurance program: (1) *Procedures and Quality Control Manual for Chemistry*

Laboratories, (2) *Standard Operating Procedures, Microbiology Laboratory*, and (3*) Procedures and Quality Control Manual for the Radiochemistry Laboratory*. The elements addressed in the manuals include organization, sample chain of custody, personnel training, quality control of laboratory services, scope and application, equipment and supplies, reagents, standards, methodology, preservation and storage, calibration, performance criteria and quality assurance, and waste management.

The overall laboratory quality assurance program contains many elements, some of which have been previously discussed. The frequency for analysis of replicates and spike recovery samples is noted in the manuals and is in compliance with U.S. EPA guidelines. Acceptance criteria for each QC check is detailed in each procedure of the SOP Manual. The Environmental Microbiology Laboratories perform replicate analyses, positive test controls, media control tests, equipment control tests, etc., as required by EPA, Laboratory Certification and Evaluation guidelines. In addition, ARESD and the Area Laboratories participate in annual Water Supply and Water Pollution Proficiency Testing Programs. All office staff who collect samples that require field testing participate in either the yearly Water Supply or Water Pollution Proficiency Testing Program, whichever is appropriate.

The laboratory analyses for water quality monitoring are conducted according to 40 CFR Parts 141, 136, and 143. The ARESD quality control manuals include a section on methodology designed to reduce variations in applied techniques among the State laboratories where methods permit analyst interpretation and thus provide a more uniform approach which will increase the reproducibility of results reported from the laboratory system. Analytical SOPs are identified by number and date of revision. Each SOP includes the approved method reference. SOPs are reviewed annually.

SOPs include instrument calibration and maintenance procedures as well as corrective actions for any deficiencies or problems encountered.

A9 QUALITY ASSURANCE MANAGER INDEPENDENCE

Paul Miller is the Project Quality Assurance Manager (QAM) and will review and approve the QAPP. The QAM is independent of BRLS and BOW environmental information operations (EIO) and is not involved with day-to-day EIO. The QAM’s responsibility is to ensure the QAPP meets agency standards and to support the Project Operations Manager. The QAM has the authority to discuss quality-related issues with senior management and will oversee corrective actions when they are needed to address data quality issues involving SCDES staff and EIO.

A10 PROJECT ORGANIZATION CHART AND COMMUNICATIONS

Leadership and Upper Management

https://des.sc.gov/sites/des/files/Library/AgencyLeadershipOrgChart.pdf

Deputy Director of Environmental Programs - Henry Porter, Henry.Porter@des.sc.gov, 803.898.1411

Full BOW

https://des.sc.gov/sites/des/files/Library/BOW_OrgChart.pdf

Aquatic Science Division, last page, page 10.

Full BRLS

https://des.sc.gov/sites/des/files/Library/BRLS_OrgChart.pdf

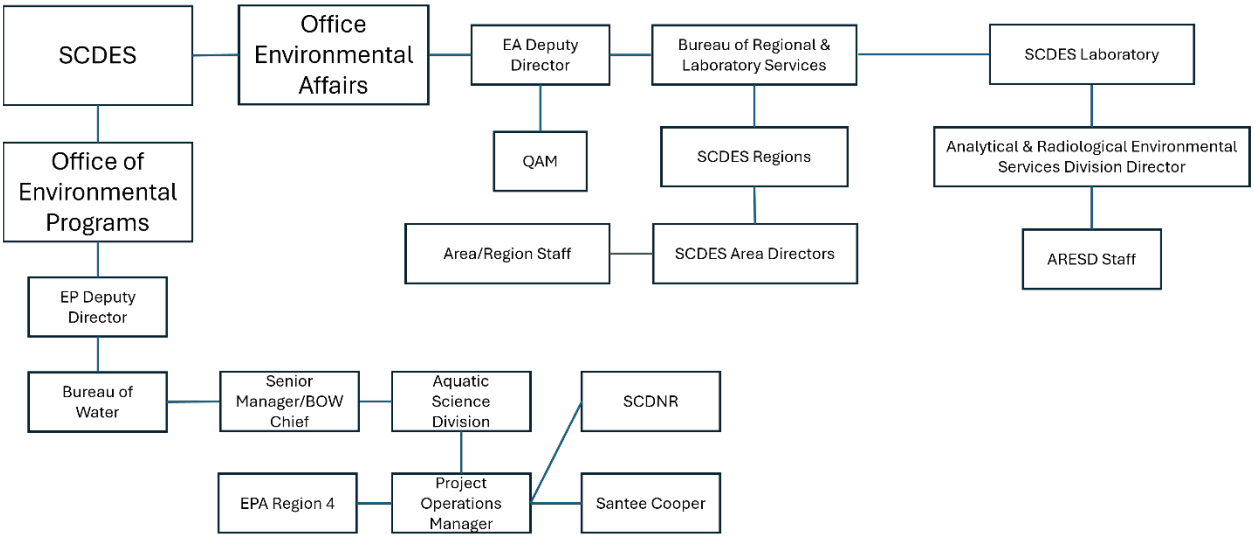

Figure 1. Programmatic Organization Chart.

A complete SCDES organization chart may be found at: https://des.sc.gov/about-scdes/organizational-charts

At this time SCDNR is a collaborative partner in in the SCECAP program but provides no

data to SCDES that is used in any CWA reporting requirements.

The South Carolina Environmental Laboratory Certification Program is authorized by Regulation 61-81 which became effective on January 1, 1981. The Regulation applies to all laboratories which generate data for compliance with state environmental regulations or that is performing any other analyses related to environmental quality evaluations required by the Department or which will be officially submitted to the Department.

Santee Cooper Public Service Authority conducts their own monitoring program, and they collaborate with the SCDES Ambient Surface Water Quality Monitoring Program to collect certain monitoring data at certain sites at the request of SCDES. The Santee Cooper laboratory is certified under the South Carolina Environmental Laboratory Certification Program for all of the data they collect at the request of SCDES, as well as the data resulting from their own monitoring program.

All programmatic QAPP non-conformance issues or discrepancies will be communicated following agency organizational or reporting structure. All issues that materially impact the overarching objectives of the programmatic QAPP or the QAPP's data quality objectives or data quality indicators are communicated to the Project Operations Manager through proper channels. Any changes to the QAPP's organizational or reporting structure will be documented as a revision and the updated QAPP will be sent to the Distribution List.

A11 PERSONNEL TRAINING/CERTIFICATION

Area monitoring personnel are trained by BRLS staff following a specific learning plan for ambient staff. It can be found here: Ambient Water Sampling.docx.

Area Laboratory personnel are trained by their immediate Area Laboratory Managers.

Central laboratory personnel are trained by their immediate supervisor.

Santee Cooper personnel are trained through the process covered by their SCDES laboratory certification.

An intranet training program has been established to ensure staff have access to the most recent revision of the field SOPs and have acknowledged they are familiar with the SOP content for specific assigned duties. Each program area will ensure that all personnel performing tasks and functions related to data quality will have the needed education, training, and experience.

Training is tracked through the MySCLearning system. A review of basic training requirements for field staff is found in Section 4 of the most current revision of SCDES's *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, and *The 200 Field*

SOP series. BRLS has a specific learning plan for ambient staff. It can be found here: Ambient Water Sampling.docx.

The training of laboratory personnel is discussed in the most current revision of SCDES's *Procedures and Quality Control Manual for Chemistry Laboratories*, Volume 1, SOP III, *Personnel Training and Standard Operating Procedures, Microbiology Laboratory*, SOP III, Staff Training. These SOPs incorporate forms for acknowledgement that the analyst has read the method, as well as tracking forms for other various types of training. This information is kept on file at the ARESD or appropriate Area Laboratory. Each analyst is required to show proficiency in the analysis prior to analyzing samples. Training and documentation of proficiency are kept on file in the appropriate laboratory.

A12 DOCUMENTS AND RECORDS

The SCDES State of South Carolina Monitoring Strategy, Technical Report 003-2025, and annual updates of the State of South Carolina Monitoring Workplan documents are developed by ARMS of the Bureau of Water. The SCDES State of State of South Carolina Monitoring Strategy documents the overall routine State monitoring plan for the Bureau of Water and the annual State of South Carolina Monitoring Workplan updates provide the annual sampling commitments by BRLS and ARMS staff.

Routine ambient surface water samples are collected by Area BRLS personnel with some analyses conducted in the Area Laboratories and others by the Central Laboratory. Data for samples that are analyzed in the Area Laboratories are reported on the appropriate data sheets and released by the sample custodian for the area. Original chain-of-custody sheets are sent to the appropriate program area. Hard copies of these data sheets are stored by ARESD in Columbia. All data are stored electronically in the laboratory LIMS.

All Ambient Surface Water Physical & Chemical Monitoring data are received by Aquatic Resource Monitoring from the Data Management Section, BRLS. The field measurements are reviewed, edited, and stored into the IMAP database. The Aquatic Resource Monitoring performs at a minimum a 10 percent review of all data to ensure quality assurance of the data. The data are uploaded to the National Water Quality Monitoring Council's Water Quality Portal water quality database at https://www.waterqualitydata.us/. Original data sheets and chains of custody are sent to the Aquatic Resource Monitoring office where a hard copy is kept on file for 12 years. BRLS also maintains a hard copy following appropriate BRLS laboratory retention schedules (generally 12 years).

The following list of documents and records are maintained and stored following appropriate BRLS retention schedules.

- Bound Field Logbooks/Workbooks
- Bound laboratory logbooks and workbooks for all parameters/methods
- Analytical sample results stored in LabWorks (LIMS)
- Hard Copies of Chain-of-Custodies

In these logbooks are recorded all routine daily meter calibration results, remarks and notes relating to all activities, and values for all field measured parameters as well as time, date, station location, and collector identification information associated with all sampling activities. This logbook format provides a legally admissible document for any court supervised compliance/enforcement proceedings.

- Chain of Custody Information
- Sample Request Sheets/Data
- EPA WQX Data
- Special Study QAPPs/Data
- Analytical Workbooks/Sample Results
- Technical Reports
- QA Assessment Reports (Lab and Field)

B1 IDENTIFICATION OF PROJECT ENVIRONMENTAL INFORMATION OPERATIONS

The EPA IT/IM Directive No: CIO 2105-S-02.1, Quality Assurance Project Plan Standard, USEPA Region 4, Non-EPA Organization QAPP Review Crosswalk, EPA QAPP Standard (CIO 2105-S-02), and the South Carolina Department of Environmental Services. Quality Management Plan, Revision 0, July 2025, were used in preparing this QAPP.

All SCDES sample collection and field measurements are conducted by Bureau of Regional and Laboratory Services (BRLS) personnel or Aquatic Resource Monitoring Section (ARMS) personnel. BRLS personnel operate out of their associated SCDES Laboratory District Office (Figure 2, Table 5) and ARMS personnel operate out of the Central Office.

Ambient Surface Water Quality Monitoring Program Design

There are currently two primary components of the Surface Water Physical, Chemical, & Microbiological Monitoring Program, including ongoing fixed-location monitoring and statewide statistical survey monitoring; each is designed to provide data for water quality assessment of major water resource types at different spatial and temporal scales.

A secondary component are Special Request Sites. Special Request Sites are temporary fixed-location sites that target locations of special interest to the Department related to specific data needs.

The fixed-location component of the monitoring network is comprised of Base Sites that are sampled once per month, year-round. Statistical Survey Monitoring Sites are sampled once per month for one year and are moved from year to year. These basic components

are discussed in the following sections.

Base Sites

Base Sites are sampled monthly, year-round, over an extended period of time, and in a uniform manner to provide solid baseline data. Base Sites were chosen to target the most downstream access (pour point) of each of the National Watershed Boundary Dataset (WBD) 10- digit watershed units (WSU) in the state, as well as the major waterbody types that occur within these WSUs. In some years, individual Base Sites may satisfy the requirements of Statistical Survey Monitoring Sites and are sampled monthly as part of that monitoring component.

For example, when a WSU ends in a major reservoir, a Base Site is placed in the impounded area to represent reservoir conditions and another Base Site is generally placed in the main stream feeding that part of the reservoir which represents conditions in the free-flowing portion of the WSU. Similarly, in a primarily riverine WSU ending in saltwater areas at the coast, Base Sites may be placed in both the free-flowing freshwater portion as well as the saltwater area to represent conditions in both habitats. The result is consistent data from all WSUs in the state that can be used in tracking standards compliance and long-term trends.

Statistical Survey Monitoring Sites

Statistical survey monitoring is a design in which the population of interest is sampled in a fashion that allows statements to be made about the whole population based on a subsample and produces an estimate of the accuracy of the assessment results. The advantage of the statistical survey sampling design is that statistically valid statements about water quality can be made about large areas based on a relatively small subsample. Statistical survey water quality data can be used to make inferences, with known confidence, about the condition of the water resources of the State.

A statewide statistical survey component, or random or probabilistic sampling design, is part of the Ambient Surface Water Physical, Chemical, Microbiological, & Algal Discrete Monitoring. Separate monitoring schemes have been developed for stream, lake/reservoir, and saltwater resources to represent the entirety of each resource type as described below. Each year a new set of statistical survey sites is selected for each waterbody type. Site selection is done by SCDES staff. Although statements about resource conditions can theoretically be made based on data from a single year, the compilation of data from additional years will increase the confidence and accuracy of statements about water quality. An additional advantage of the statistical survey approach is that it presents the opportunity for previously unsampled locations to be selected for data collection.

In a statistical survey design, each sampled monitoring site is assigned a weight based on the size of the stratum (subpopulation) it represents and the total number of sites sampled in that stratum. There is no preset weight. The weight is assigned after all of the sites have been sampled. It is dependent on the size of each stratum in the design and how many sites are actually sampled in each stratum during each survey period.

So each individual site is assigned a weight based on the stratum if falls in and the total number of sites that ended up being sampled in that stratum in that survey cycle.

Not every potential site can always be sampled. So the weight for each sampling site in each stratum is determined after all of the sites have been sampled.

Total resource size, and individual stratum size, is recalculated each survey cycle based on not only how many sites were actually sampled in that cycle, but how many sites were selected that were not actually part of the identified target population. The GIS representation of the target population and individual strata frequently does not reflect on the ground reality.

Streams

Approximately 30 statistical survey stream sites (RS) will be sampled each year. Some of the statistical survey locations may correspond to existing fixed Base Sites. Each statistical survey site will be sampled monthly for one year and may be prioritized for a macroinvertebrate community and habitat analysis. Streams of different sizes may be more or less sensitive to different types of environmental perturbations. Because of this, three stream sizes have been specifically targeted to ensure they are represented in the selected statistical survey sites.

1. First Order streams, or headwater streams, are targeted because these represent streams with the least dilution capacity and therefore are most immediately impacted by adjacent land use activities and associated runoff. These streams may also serve as spawning areas for fish and refuge areas for young from larger aquatic predators.

2. Second and Third Order streams, are also streams with relatively small dilution capacity and represent important habitat for reproduction and survival of aquatic life. They may also reflect the direct impacts of major land use activities.

3. Fourth Order and larger streams include the major rivers of the State. In general, these streams have greater dilution capacity and are less affected by small-scale land use perturbations and may be heavily utilized for contact recreation.

These different sizes do not occur in equal proportions in the state; therefore, an unequal weighting procedure is used in the site selection process to guarantee inclusion of all three sizes. Each year the design goal will be 8 First Order stream sites, 10 Second and Third Order stream sites, and 12 Fourth Order and larger stream sites. Taken together and using the proper weighting factors, the random stream sites can be used to make statistically valid statements with 95% confidence about all stream resources of the State
.

Lakes/Reservoirs

Approximately 30 statistical survey lake sites (RL) will be sampled each year. Some of the statistical survey locations may correspond to existing fixed Base Sites. Each statistical survey site will be sampled monthly for one year. Eligible lakes/reservoirs are restricted to "significant lakes", which refers to those freshwater lakes/reservoirs with at least 40 acres surface area that offer unrestricted public access. The size of significant lakes/reservoirs varies immensely; therefore, two size classes of lakes/reservoirs have been specifically targeted to ensure that the smaller lakes/reservoirs are represented in the selected statistical survey sites.

1. Major Lakes/Reservoirs- greater than 850 acres surface area.

2. Minor Lakes/Reservoirs- greater than 40 acres surface area, but less than or equal to 850 acres.

Each year there will be 20 Major Lake/Reservoir sites and 10 Minor Lake/Reservoir sites. Taken together and using the proper weighting factors, the statistical survey lake/reservoir sites can be used to make statistically valid statements with 95% confidence about all lake/reservoir resources of the State.

Saltwaters

The coastal saltwater statistical survey monitoring scheme has been developed jointly by SCDES, Bureau of Water, and the South Carolina Department of Natural Resources (SCDNR) Marine Resources Research Institute (MRRI). This effort is known as the South Carolina Estuarine and Coastal Assessment Program (SCECAP, https://www.dnr.sc.gov/marine/scecap/summary.html). At this time no SCECAP data are included in any Clean Water Act reporting requirements. To ensure inclusion of a variety of saltwater ecosystems and habitats, the coastal saltwaters have been divided into two discrete categories (strata), Tidal Creeks and Open Water areas, based on a common GIS cover developed and utilized by both agencies. All internal GIS layers are stored on SCDES servers and are managed by SCDES Office of Technology (OT). OT has no involvement in this programmatic QAPP. Each year there will be 15 Tidal Creek (RT) sites, 15 Open Water (RO) sites. Some of the statistical survey locations may correspond to existing fixed Base Sites.

1. Tidal Creeks, identified as less than 100 meters wide on the GIS cover, serve as nursery areas for important marine species and are most immediately affected by upland land use activities and associated runoff.

2. Open Water areas, identified as greater than 100 meters wide on the GIS cover, represent larger saltwater rivers and sounds.

The sampling of the statistical survey coastal saltwater sites is a cooperative venture between SCDES and SCDNR-MRRI. The Sites are sampled monthly for one year by BRLS personnel from the assigned SCDES Field Laboratory Office. SCDNR-MRRI samples each site once annually for sediment chemistry, sediment physical characteristics, sediment

toxicity, benthic infauna community composition, fish trawls, and personnel deploy multi-parameter datasondes for up to 25 hours. Aquatic Science Program personnel collect water samples in coordination with SCDNR-MRRI sampling crew.

Each year there will be 15 Tidal Creek sites and 15 Open Water sites. Taken together and using the proper weighting factors, the statistical survey monthly data collected by SCDES at these sites can be used to make statistically valid statements with 95% confidence about all saltwater resources of the State.

Special Request Sites

Special Request Sites are temporary fixed-location sites that target locations of special interest to the Department related to specific data needs. Examples of site selection criteria for establishment of Special Request Sites include, but are not limited to:

1. Tracking the progress of specific remediation activities.
2. Gathering additional data in specific areas for the development of total Maximum Daily Loads (TMDLs).
3. Gathering data for Wasteload Allocation modeling needs.
4. Gathering data for establishing, reviewing, and revising water quality Standards.
5. Obtaining data necessary for setting NPDES permit limits.

Special Request Sites are also sampled monthly, year-round, over a finite time period.

B2 METHODS FOR ENVIRONMENTAL INFORMATION ACQUISITION

All SCDES Ambient Surface Water Quality Monitoring Program samples are collected by, and field measurements conducted by, Bureau of Regional and Laboratory Services (BRLS) personnel from the corresponding SCDES Field Laboratory District Office or ARMS personnel from the Central Office in accordance with the SCDES Quality Management Plan, Table 4.

All field sample collection procedures and field measurements follow the most current revisions of SCDES's Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, SCDES Quality Management Plan, Level 100 Quality SOP series, Level 200 series: 200 - Ambient Surface Water Sampling, 201- Field Temperature Measurement in Surface Water, 202 - Field Dissolved Oxygen Measurement in Surface Water, 203 - Field pH Measurement in Surface Water, 204 - Field Specific Conductance Measurement in Surface Water, and 205 - Multi-Parameter Field Measurements in Surface Water, and Algal Bloom and Cyanotoxin Field Collection Standard Operating Procedures listed in Table 4.

The Level 100 Quality SOP series, and Level 200 Surface Water SOP series are reviewed

annually, and maintained and updated by the SCDES Quality Assurance Manager (QAM). The Chlorophyll A Laboratory Methods, and Determination of Total Microcystins and Cylindrospermopsin in Ambient Water are reviewed annually and maintained by SCDES ASD staff.

The *Level 200 Surface Water SOP* manuals describe the field sampling procedures by matrix, field instrument calibration and verification standards, sample chain of custody documentation, sample preservation, holding times and recommended sample containers specifications, data sheet examples, and data submission requirements.

Sample preservation, holding times and recommended sample containers specifications, are also specified in *Procedures and Quality Control Manual for Chemistry Laboratories* SOP IV-B-1 Sample Containers, Preservation, and Maximum Holding Times for Chemistry, Microbiology, and Radiochemistry Analyses (Table 7).

Corrective actions related to field activities are initiated by field staff in the Area offices. The process field staff will follow to obtain approval for corrective actions and determine effectiveness of those actions are outlined in BRLSPROC101 – Control of Non-conforming Work SOP and BRLSPROC102 - Field Competency, Proficiency, and Corrective Action SOP (Table 4).

Documentation of missed sites or samples are reported directly to ASD staff via a ReadyOp form and also documented in the Integrated Monitoring and Assessment Program (IMAP) system.

Immediate questions related to sample collection while onsite in the field are directed by phone to ARMS staff.

The ARESD quality control manuals which detail the day-to-day operation of the laboratory analytical quality assurance program are *Procedures and Quality Control Manual for Chemistry Laboratories*, and *Standard Operating Procedures, Microbiology Laboratory*. The elements addressed in the manuals include organization, sample chain of custody, personnel training, quality control of laboratory services, scope and application, equipment and supplies, reagents, standards, methodology, preservation and storage, calibration, performance criteria and quality assurance, and waste management. These two documents are reviewed annually and updated as needed by the BRLS Laboratory Managers.
The *Chlorophyll A Laboratory Methods*, and *Determination of Total Microcystins and Cylindrospermopsin in Ambient Water* are reviewed annually and maintained by SCDES ASD staff.
All laboratory analyses are performed according to the most current revisions of SCDES's *Procedures and Quality Control Manual for Chemistry Laboratories* and the *Standard Operating Procedures, Microbiology Laboratory, Chlorophyll A Laboratory Methods*, and *Determination of Total Microcystins and Cylindrospermopsin in Ambient Water* listed in Table 4.

Within the *Procedures and Quality Control Manual for Chemistry Laboratories* Laboratory SOP, sections II QC, and IV-G Data Control Recording Notes, describe the procedures to be followed when non-compliance or failure in chemical analytical systems occur.

Within the *Standard Operating Procedures, Microbiology Laboratory* SOP, sections II QA-QC MICRO, and IV-E Data Control Recording Notes MICRO describe the procedures to be followed when non-compliance or failure in microbiological analytical systems occur.

Sample preservation, holding times and recommended sample containers specifications, are contained in SOP IV-B-1 Sample Containers, Preservation, and Maximum Holding Times for Chemistry, Microbiology, and Radiochemistry Analyses (Table 7).

Sample container preparation is documented in SOP IV-B-2 Cleaning of Sample Containers (Table 7).

Since this is a continuous, ongoing, program there is no specific data package turnaround requirement.

There are no non-standard methods outside of the cited SOPs implemented in this program.

This program only generates new data, it does not incorporate existing information.

This program uses only the standard environmental technology documented in the cited SOPs. All of the SOPs cited are living documents and any reference to a specific document refers to the most current updated version.

These manuals are mainly internal documents and are not readily accessible outside of the Department. Upon request, specific sections of the Environmental Investigations Standard Operating Procedures and Quality Assurance Manual or documents may be released to external parties with the approval of the QAM. The BRLS procedures may be released with the approval of the Laboratory Assistant Bureau Chief.

Table 4. SCDES Standard Operating Procedures and Quality Control Documents

SOP Document	Revision Date
South Carolina Department of Environmental Services. Quality Management Plan	Revision 0, 7/2025.
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services. Field Quality Plan Protocol, BRLSPROC100 – Quality Management Plan Components	Revision 1.2, 03/04/2025
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services. Field Quality Plan Protocol, BRLSPROC101 – Control of Nonconforming Work	Revision 1.2, 03/04/2025
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services. Field Quality Plan Protocol, BRLSPROC102 - Field Competency, Proficiency, and Corrective Action	Revision 1.2, 03/04/2025

SOP Document	Revision Date
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services. Field Quality Plan Protocol, BRLSPROC104 - Field Equipment Traceability, Maintenance, and Calibration	Revision 1.2, 03/04/2025
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services. Field Quality Plan Protocol, BRLSPROC105 - Field Sampling Quality Control	Revision 1.2, 03/04/2025
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services. Field Quality Plan Protocol, BRLSPROC106 - Standard Office Cleaning Procedures	Revision 1.2, 03/04/2025
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services. Standard Operating Procedure, BRLSPROC107 - Standard Field Cleaning Procedures	Revision 1.2, 03/04/2025
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services. Standard Operating Procedure, BRLSPROC108- Sample Containers, Preservation, and Maximum Holding Times for Chemistry and Microbiological Analyses	Revision 1.2, 03/04/2025
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services. Field Quality Plan Protocol, BRLSPROC109 – BRLS Field Data Review and Verification	Revision 1.1, 03/04/2025
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services. Field Quality Plan (Standard Operating Procedures), BRLSPROC 200 - Ambient Surface Water Sampling	Revision 1.2, 10/29/2025
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services. Field Quality Plan (Standard Operating Procedures), BRLSPROC 201 - Field Temperature Measurement in Surface Water	Revision 1.1, 10/29/2025
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services. Field Quality Plan (Standard Operating Procedures), BRLSPROC 202 - Field Dissolved Oxygen Measurement in Surface Water	Revision 1.1, 10/29/2025

SOP Document	Revision Date
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services. Field Quality Plan (Standard Operating Procedures), BRLSPROC 203 - Field pH Measurement in Surface Water	Revision 1.1, 10/29/2025
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services. Field Quality Plan (Standard Operating Procedures), BRLSPROC 204 - Field Specific Conductance Measurement in Surface Water	Revision 1.1, 10/29/2025
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services. Field Quality Plan (Standard Operating Procedures), BRLSPROC 205 - Multi-Parameter Field Measurements in Surface Water	Revision 1.1, 10/29/2025
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services, Analytical and Radiological Services Division – *Procedures and Quality Control Manual for Chemistry Laboratories*	Full document revised 02/26. Subsequent revisions by individual Section
South Carolina Department of Environmental Services, Bureau of Regional and Laboratory Services, Analytical and Radiological Services Division – *Standard Operating Procedures, Microbiology Laboratory*	Full document revised 11/24. Subsequent revisions by individual Section
South Carolina Department of Health and Environmental Control. Environmental Investigations Standard Operating Procedures and Quality Assurance Manual. https://dhecnet.dhec.sc.gov/eqc/envserv/sopqamanual.htm	No Revision Date
South Carolina Department of Environmental Services, Bureau of Water, Aquatic Science Division, Aquatic Resource Monitoring Section. Standard Operating Procedure for Continuous Monitoring of Ambient Surface Water Using Multi-Parameter Water Quality Data Sondes. ASDPROC 003.	Version: December 2025, Revision 1.2
South Carolina Department of Environmental Services, Bureau of Water, Aquatic Science Division, Aquatic Resource Monitoring Section. Standard Operating Procedure for Chlorophyll A Laboratory Methods. ASDPROC 004.	Version: January 2026, Rev.7
South Carolina Department of Health and Environmental Control, Bureau of Water. Algal Bloom and Cyanotoxin Field Collection Standard Operating Procedures.	February 23, 2021

SOP Document	Revision Date
South Carolina Department of Health and Environmental Control, Bureau of Water. Determination of Total Microcystins and Cylindrospermopsin in Ambient Water. ASDPROC 008	Revision 3.0, February, 2026

Sample Collection Responsibilities by BRLS Areas and Laboratory Districts

The BRLS has 8 Areas and 12 Local Office locations. Sampling responsibilities are assigned to 7 Laboratory (Lab) Districts, see Table 5 and Figure 2. These District boundaries are not recognized by SCDES for any other purpose beyond the Ambient Surface Water Quality Monitoring Program.

The BRLS organizational structure encompasses the Central Laboratory (ARESD) and seven Area Laboratories. ARESD, also known as the Central Laboratory, includes the following laboratories: Microbiology and Sample Characterization, Inorganic Chemistry, Organic Chemistry, Radiochemistry and the Sample and Data Management Section. The seven Area Laboratories are located in Aiken, Beaufort, North Charleston, Florence, Greenville, Lancaster, and Myrtle Beach. The Columbia Local Office is separate from ARESD but collects samples for this lab. ARESD, in turn, performs similar functions as the other Area Laboratories for the Columbia Office.

The ARESD and six of the Area Laboratories in the BRLS provides laboratory services to the Bureau of Water. The analytical services offered include bacteriological, chemical, and physical analyses. Chlorophyll-a and cyanotoxin analyses are conducted by the ARMS laboratory. The Myrtle Beach Area Laboratory does not provide any analytical services to the BOW at this time
.
For the purpose of the Ambient Surface Water Quality Monitoring program, the state's Area monitoring responsibilities are divided into 7 Laboratory District Areas - Appalachia II, Catawba, Central Midlands, Low Country, Lower Savannah, Pee Dee, and Trident. District Laboratory sample collection responsibilities were historically established by District Managers and revised by subsequent Regional Managers. The counties included in each District Laboratory area of responsibility was determined based on travel times and sample holding times. Table 5 lists the location of each Laboratory District, associated Area Laboratory, and the counties included in each respective area of responsibility.

Table 5. Laboratory District Area Responsibilities

Laboratory District	Area Laboratory Location	Counties
Appalachia II	Greenville	Abbeville, Anderson, Greenville, Laurens, Oconee, Pickens, Spartanburg
Catawba	Lancaster	Cherokee, Chester, Chesterfield, Kershaw, Lancaster, Union, York
Central Midlands	Columbia - Central Lab	Calhoun, Fairfield, Lexington, Newberry, Richland
Low Country	Beaufort	Beaufort, Colleton, Hampton, Jasper
Lower Savannah	Aiken	Aiken, Allendale, Bamberg, Barnwell, Edgefield, Greenwood, McCormick, Orangeburg, Saluda
Pee Dee	Florence	Clarendon, Darlington, Dillon, Florence, Georgetown, Horry, Lee, Marion, Marlboro, Sumter, Williamsburg
Trident	Charleston	Berkeley, Charleston, Dorchester

Laboratory District boundaries are displayed in Figure 2.

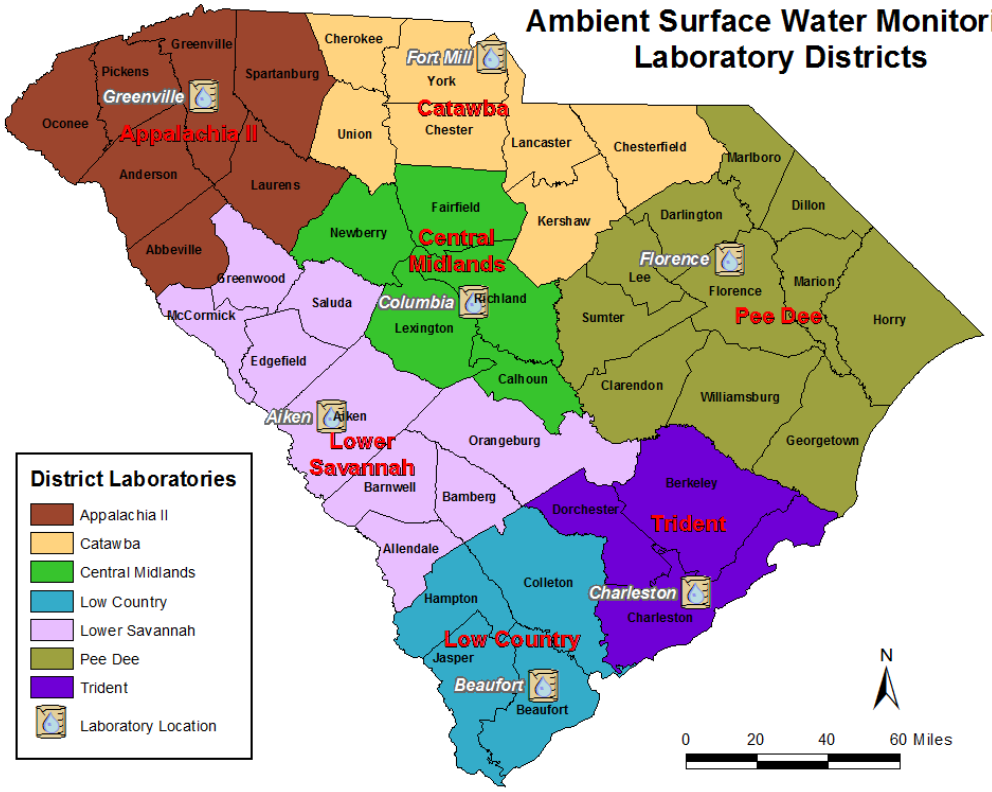

Figure 2. SCDES Laboratory Districts

The District Laboratories initiate all sample collection and laboratory analyses. The Central Laboratory provides support analyses, i.e., metals, nutrient, extraction procedures, and organic analyses.

Please refer to Table 2 for the Routine Ambient Surface Water Quality Monitoring Parameters, Analytical Methods, Reporting Limits, and Reporting Units.

Table 6. SOP References for the Routine Monitoring Parameters for the Ambient Surface Water Quality Monitoring Program

Analysis/Parameter Name	SCDES Lab Method for Ambient Surface Water Monitoring	SOP Title	SOP Number & Revision
Field Data			
Depth of Sample Collection m		BRLSPROC 200	Revision 1.2, 10/29/2025
Air Temperature °C		BRLSPROC 201	Revision 1.1, 10/29/2025
Water Temperature °C		BRLSPROC 201	Revision 1.1, 10/29/2025
Field Dissolved Oxygen mg/L		BRLSPROC 202	Revision 1.1, 10/29/2025
Field pH SU		BRLSPROC 203	Revision 1.1, 10/29/2025
Additional Saltwater Field Parameters			
Specific Conductance umhos/cm		BRLSPROC 204	Revision 1.1, 10/29/2025
Salinity ppt		BRLSPROC 204	Revision 1.1, 10/29/2025
Lake Sites			
Chlorophyll-a ug/L (Corrected)		South Carolina Department of Health and Environmental Control, Bureau of Water. Chlorophyll A Laboratory Methods	Revision 6.0, May 20, 2024
Secchi Depth m		BRLSPROC 200	Revision 1.2, 10/29/2025
General Parameters			
Chemistry QA Plan		ARESD Procedures and Quality Control Manual for Chemistry Laboratories	II-QC Revision 03/2025
Turbidity - NTU	EPA 180.1	Standard Operating Procedure for Turbidity	IX-B-14(b) 06/2024
5 Day BOD Streams mg/L	SM 5210 B	Standard Operating Procedure for Stream BOD	IX-B-2(b) Revision 07/2020
Alkalinity mg/L	SM 2320B	Standard Operating Procedure for Automated Alkalinity and pH	IX-B-7(b) Revision 06/2024

Analysis/Parameter Name	SCDES Lab Method for Ambient Surface Water Monitoring	SOP Title	SOP Number & Revision
Ammonia as N mg/L	FIALab 100	Standard Operating Procedure for Nitrogen, Ammonia	IX-C-4(d) Revision 03/2025
Total Kjeldahl Nitrogen in Water as N mg/L	QuikChem 10-107-06-2-H [1]Transitioning to FIALab 100	Standard Operating Procedure for TKN in Water	IX-C-7 Revision 01/2015
Nitrate/Nitrite as N mg/L	QuikChem 10-107-04-1-C [1]Transitioning to SM 4500NO3-F	Standard Operating Procedure for Nitrate/Nitrite in Water	IX-C-5 Revision 12/2024
Total Phosphorus as P in Water mg/L	QuikChem 10-115-01-1-E [1]Transitioning to SM 4500P-H	Standard Operating Procedure for Total Phosphorus in Water	IX-C-11(a) Revision 01/2018
Cadmium in Water mg/L	EPA 200.8	Standard Operating Procedure for Trace Metals by ICP-MS	IX-D-7 Revision 10/2024
Chromium in Water mg/L	EPA 200.7	Standard Operating Procedure for Trace Metals by ICP-AES	IX-D-6 Revision 04/2024
Copper in Water mg/L	EPA 200.7	Standard Operating Procedure for Trace Metals by ICP-AES	IX-D-6 Revision 04/2024
Iron in Water mg/L	EPA 200.7	Standard Operating Procedure for Trace Metals by ICP-AES	IX-D-6 Revision 04/2024
Lead in Water mg/L	EPA 200.8	Standard Operating Procedure for Trace Metals by ICP-MS	IX-D-7 Revision 10/2024
Manganese in Water mg/L	EPA 200.7	Standard Operating Procedure for Trace Metals by ICP-AES	IX-D-6 Revision 04/2024
Nickel in Water mg/L	EPA 200.7	Standard Operating Procedure for Trace Metals by ICP-AES	IX-D-6 Revision 04/2024
Zinc in Water mg/L	EPA 200.7	Standard Operating Procedure for Trace Metals by ICP-AES	IX-D-6 Revision 04/2024
Mercury in Water mg/L	SM 3112B	Standard Operating Procedure for Mercury in Water by CVAA	IX-D-4(a) Revision 01/2025
Freshwater stream samples whenever metals are collected			
Total Suspended Solids mg/L	SM 2540D	Standard Operating Procedure for Solids, Total Suspended (TSS, Dried at 103-105°C)	IX-B-10(c) Revision 05/2023
Freshwater samples whenever metals are collected			
Hardness, calculated mg/L	EPA 200.7	Standard Operating Procedure for the Analysis of Calcium Hardness and Total Hardness by Calculation	IX-D-8 Revision 09/2023
Freshwater Bacterial Indicator			
Microbiology QA Plan		ARESD Standard Operating Procedures, Microbiology Laboratory	II-QAQC Revision 12/2024

Analysis/Parameter Name	SCDES Lab Method for Ambient Surface Water Monitoring	SOP Title	SOP Number & Revision
E. coli by Quanti-Tray MPN/100 mL	SM 9223B	Standard Operating Procedures for Enzyme Substrate Test for Presence/Absence and Quantitation of Total Coliforms and E. coli	VIII-B-1 Revision 05/2024
Saltwater Bacterial Indicator			
Microbiology QA Plan		ARESD Standard Operating Procedures, Microbiology Laboratory	II-QAQC Revision 12/2024
Enterococci Bacteria by Quanti-Tray MPN/100 mL	ENTEROLERT	Standard Operating Procedures for Enzyme Substrate Test Quantitation of Enterococci	VIII-B-2 Revision 04/2021

[1]These parameters are under transition to new instrumentation and methods. The projected completion is by the end of 2026.

Please refer to Table 3 for the Bureau of Water Calibration Verification Criteria.

Scheduling and coordination with the BRLS

Scheduling and coordination with the BRLS personnel from the corresponding SCDES Field Laboratory District Office and ARMS sampling staff is conducted primarily through the Integrated Monitoring and Assessment Program (IMAP) application.

Each year ARMS staff develop a list of the monitoring sites each Laboratory District Office will be responsible for sampling and distribute it to the Laboratory District Office and ARMS sampling staff. ARMS staff populate an annual project in IMAP with the monitoring sites to be sampled by each Laboratory District Office monitoring staff, and the parameters and associated sampling frequency to be collected at each monitoring site.

The Laboratory District Office sampling staff develop Stream Runs and enter them into IMAP. A Stream Run is a group of monitoring sites where samples can be collected in a single day and delivered to the Area Laboratory within the prescribed sample holding times. Each month the Laboratory District Office sampling staff can generate a report that lists the parameters to be collected at each site on a Stream Run for that month and use it to prepare the necessary sampling equipment and bottles to collect the required samples for laboratory analysis.

The scheduling of each Stream Run for each month is set by the Laboratory District Office sampling staff.

B3 INTEGRITY OF ENVIRONMENTAL INFORMATION

Samples collected by District staff are transported to the BRLS Central Laboratory or ARMS by Agency courier.

All sample collection and chain of custody procedures follow the most current revision of SCDES's *Quality Management Plan, Level 100 Quality SOP* series, and *Level 200 Surface Water SOP* series. All laboratory analyses are performed according to the most current revisions of SCDES's *Procedures and Quality Control Manual for Chemistry Laboratories* and the *Standard Operating Procedures, Microbiology Laboratory*. See Table 4.

Table 7. List of ARESD Laboratory SOPs addressing Chain-of-Custody procedures, sample containers, and preservation requirements:

SOP Name	Revision
IV-A Chain-of-Custody	04/2024
IV-B-1 Sample Containers, Preservation, and Maximum Holding Times for Chemistry, Microbiology, and Radiochemistry Analyses	04/2024
IV-B-1 Glassware, Sample Containers, Preservation, and Maximum Holding Times for Microbiological Analysis	04/2024
IV-B-2 Cleaning of Sample Containers	04/2024
IV-B-3 Preservative Tracking	06/2024

The BRLS Analytical and Radiological Environmental Services Division (ARESD) laboratories analyze the resulting chemical and microbiological samples. ARESD is certified by EPA for drinking water analyses and are evaluated by EPA at least every three years. The same procedures for drinking water are also applied to the non-drinking water parameters. ARESD operates a formal quality assurance program which implements all EPA requirements and incorporates many ISO quality standards and practices. All SCDES labs and participate in annual Proficiency Testing every year for all applicable parameters.

All area laboratories have primary drinking water certification through EPA and non-drinking water certification through the SCDES Office of Environmental Laboratory Certification.

Specific performance and measurement criteria are addressed in each field and analytical SOP. Acceptance criteria for reporting results are also stated in each SOP. Reporting limits for all analytical measurements may be referenced in Section IV-J of the most current revision of SCDES's Procedures and Quality Control Manual for Chemistry Laboratories. SOP II, Quality Assurance of Analytical Performance A of the lab manual addresses control of analytical performance. Precision, accuracy, data verification, data quality audits, corrective actions, evaluating statistical control, and anomaly determination are covered. SOP II, Quality Assurance/Quality Control Plan of the most current revision of SCDES's Standard Operating Procedures, Microbiology Laboratory, covers similar details for microbiological analyses. The Quality Assurance Policy and criteria for assessing data quality is discussed in Section 3 of the

most current revision of SCDES's Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, SCDES Quality Management Plan, Level 100 Quality SOP series, and Level 200 Surface Water SOP series.

SOP 200 - Ambient Surface Water Sampling, addresses sample collection, recording of field measurements in logbooks, sample chain of custody documentation, and sample delivery and shipping to the receiving laboratories.

SOPs 201 through 205 describe the field instrument calibration and verification standards for the individual field parameters. Each SOP also addresses recording of field measurements in logbooks, sample chain of custody documentation, and sample delivery and shipping to the receiving laboratories.

B4 QUALITY CONTROL

The ABC of the BRLS Laboratories, along with the Division Director of ARESD, and the QAAs coordinate the internal ARESD quality assurance program. The laboratory quality assurance program encompasses every aspect of the laboratory analysis from container preparation through the actual data release from ARESD to the Environmental Programs.

The overall laboratory quality assurance program contains many elements. The frequency for analysis of replicates and spike recovery samples is noted in the manuals and is in compliance with U.S. EPA guidelines. Section 8 of each analytical SOP includes QC check requirements, frequency, acceptance criteria, and corrective actions for out-of-control data. The laboratory analyst will determine the effectiveness of any corrective actions taken to address out-of-control data. The Environmental Microbiology Laboratories perform replicate analyses, positive test controls, media control tests, equipment control tests, etc., as required by EPA, Laboratory Certification and Evaluation guidelines. In addition, ARESD and the area laboratories participate in annual Water Supply and Water Pollution Proficiency Testing Programs. All area staff who collect samples that require field testing participate in either the yearly Water Supply or Water Pollution Proficiency Testing Program, whichever is appropriate.

The laboratory analyses for water quality monitoring are conducted according to 40 CFR Parts 141, 136, and 143. The ARESD quality control manuals include a section on methodology designed to reduce variations in applied techniques among the State laboratories where methods permit analyst interpretation and thus provide a more uniform approach which will increase the reproducibility of results reported from the laboratory system. Analytical SOPs are identified by number and date of revision. Each SOP includes the approved method reference. SOPs are reviewed annually.

The calculation of any applicable statistics, e.g. precision, bias, etc., are implemented as required by the chemical specific analytical method and *Procedures and Quality Control Manual for Chemistry Laboratories* Laboratory SOP, section II. Statistics such as precision and bias are not applicable to microbiological analytical methods used by the SCDES Ambient Surface Water Quality Monitoring Program.

Within the *Procedures and Quality Control Manual for Chemistry Laboratories* Laboratory SOP, sections II QC, and IV-G Data Control Recording Notes, describe the procedures to be followed when non-compliance or failure in chemical analytical systems occur.

Within the *Standard Operating Procedures, Microbiology Laboratory* SOP, sections II QA-QC MICRO, and IV-E Data Control Recording Notes MICRO describe the procedures to be followed when non-compliance or failure in microbiological analytical systems occur.

SCDES'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 outlined in the *SCDES Quality Management Plan*. This plan describes how programs within the Office of Environmental Affairs (EA) and Office of Environmental Programs (EP) will plan, implement, and assess the quality of environmental work to be performed as part of the various programs' functions within the Agency.

The Deputy Director of the Office of Environmental Affairs has the overall responsibility for the development, implementation, and continued operation of EA's Quality Assurance (QA) Program. To ensure that EA's QA Program is uniformly applied to the generating and processing of all environmental data, a Quality Assurance Manager (QAM) has been appointed.

The QAM is responsible for the Quality Assurance Program. Environmentally related measurement activities conducted by or for DES shall be done only with the approval of the QAM and/or QAM designee after ensuring that adequate quality assurance guidelines and procedures have been incorporated. This includes study planning, sample collection, preservation and analysis, data handling, and use of physical, chemical, biological, and other data related to the effects, sources, transport and control of pollution, as well as personnel review and training.

Two basic tools for QA management are QA Project Plans (QAPPs) and Standard Operating Procedures (SOPs). Routine monitoring activities are implemented under this Programmatic QAPP and associated SOPs. Nonpoint source §319 grant sampling is also covered by this Programmatic QAPP
.
Identifying quality problems and improving performance are key components in our quality improvement efforts. The Laboratory Assistant Bureau Chief (ABC) is responsible for responding to and resolving all quality assurance problems and needs for the central office laboratory. Additionally, the Laboratory ABC provides support to the areal laboratories specifically related to the laboratory testing performed. All quality issues for the central office laboratory which require responding to or resolving will be addressed by the ABC. Staff are expected to initiate corrective actions immediately to resolve QA issues and concerns, to document corrective action and the results of the corrective action. Area laboratories and laboratories external to the agency that fail Proficiency Studies must submit a letter to the Office of Environmental Laboratory Certification explaining the reason for the failure and the correction action taken. Area Directors and Laboratory Managers are responsible for making sure corrective actions have been implemented, were effective, and reported to the appropriate Program manager, Project manager, Quality Assurance Assistants (QAAs), and/or the ABC.

Corrective actions related to field activities are initiated by field staff in the Area offices. The process field staff will follow to obtain approval for corrective actions and determine effectiveness of those actions are outlined in BRLSPROC101 – Control of Non-conforming Work SOP and BRLSPROC102 - Field Competency, Proficiency, and Corrective Action SOP.

Documentation of missed sites or samples are reported directly to ASD staff via a ReadyOp form and also documented in the Integrated Monitoring and Assessment Program (IMAP) system.

Immediate questions related to sample collection while onsite in the field are directed by phone to ARMS staff.

The following SOPs define the general quality assurance practices of the SCDES laboratories. Specific quality control for the instrumentation and procedures can be found in the specific method SOPs listed in Table 6.

Table 8. Procedures and Quality Control Manual for Chemistry Laboratories

SOP II Quality Control of Analytical Performance (Chemistry Manual) describes data reduction, validation, reporting, and verification for chemistry analyses.

SOP Name	Revision
II Quality Control of Analytical Performance (Chemistry Manual)	03/2025
IV-B-4 Traceability	03/2024
IV-F Laboratory Workbooks	03/2024
IV-G Data Control Recording Notes	06/2024
IV-H Significant Figures	05/2023
IV-I Reporting Requirements	05/2024
IV-J Reporting Limits	04/2024
IV-L-1 Forms Handling	02/2024
IV-L-3 Record Retention and Storage	03/2024

Table 9. Laboratory Procedures for Environmental Microbiology

SOP II Quality Control of Analytical Performance (Micro Manual) describes data reduction, validation, reporting, and verification for microbiological analyses.

SOP Name	Revision
II Quality Assurance/Quality Control Plan (Micro Manual)	12/2024
II-A Equipment Control	02/2024
II-B Lab Materials Control	11/2024
II-C Sterilization Techniques	11/2024
II-D Laboratory Pure Water	11/2024
II-E Stock Culture Control	02/2024
II-F Media Control	04/2024
II-H Traceability	02/2024
IV-C-1 Forms Design and Printing	03/2024

SOP Name	Revision
IV-C-2 Records Storage	03/2024
IV-D Laboratory Logbooks	02/2024
IV-E Data Control Recording Notes	05/2024
IV-F Reporting Requirements	06/2024
IV-G Acceptable Limits	04/2024

B5 INSTRUMENTS/EQUIPMENT CALIBRATION, TESTING, INSPECTION, & MAINTENANCE

SCDES's sampling manuals (Table 4) are titled the Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, 200 - Ambient Surface Water Sampling, 201- Field Temperature Measurement in Surface Water, 202 - Field Dissolved Oxygen Measurement in Surface Water, 203 - Field pH Measurement in Surface Water, 204 - Field Specific Conductance Measurement in Surface Water, and 205 - Multi-Parameter Field Measurements in Surface Water. These documents are reviewed periodically and updated as needed. However, staff can choose to update more frequently if changes in regulation or methodology require it.

SOP 200 - Ambient Surface Water Sampling, addresses sample collection, recording of field measurements in logbooks, sample chain of custody documentation, and sample delivery and shipping to the receiving laboratories.

SOPs 201 through 205 describe the field instrument calibration and verification standards and documentation in the monitoring staff logbooks for the individual field parameters.

In these logbooks are recorded all routine daily meter calibration results, remarks and notes relating to all activities, and values for all field measured parameters as well as time, date, station location, and collector identification information associated with all sampling activities. This logbook format provides a legally admissible document for any court supervised compliance/enforcement proceedings.

Sample preservation, holding times and recommended sample containers specifications, are contained in SOP IV-B-1 Sample Containers, Preservation, and Maximum Holding Times for Chemistry, Microbiology, and Radiochemistry Analyses (Table 7).

These manuals are mainly internal documents and are not readily accessible outside of the Department. Upon request, specific sections of the Environmental Investigations Standard Operating Procedures and Quality Assurance Manual or documents may be released to external parties with the approval of the QAM. The BRLS procedures may be released with the approval of the Laboratory Assistant Bureau Chief.

These manuals describe all procedures and documentation activities that are performed to ensure that the instruments/equipment are available and in working order when needed. They also describe how calibration is conducted, documented, and is traceable to each individual

instrument.

These manuals describe procedures and documentation activities on how instruments and equipment are tested, inspected, and maintained.

ARMS maintains spare parts and provides operating guidance of the field instruments and equipment.

B6 INSPECTION/ACCEPTANCE OF SUPPLIES AND SERVICES

Field meters and sonde maintenance are conducted by the field monitoring staff with assistance from ARMS staff when needed. Sonde repair and factory maintenance is coordinated through ASD.

Standards for meter calibration and verification are purchased from commercial vendors and inspected upon receipt by the individual who ordered them or prepared in the BRLS Regional labs. Each lab is responsible for ordering or preparing their own standards. Each lab maintains a chemical inventory log and reagent prep log. See Quality Control of Analytical Performance (Chemistry Manual) SOP IV-B-4 Traceability for details.

ARESD and the field laboratories are responsible for inspection and acceptance of laboratory related supplies.

The field laboratories are responsible for requesting the preservatives in order to maintain an ample quantity; and the central and area laboratories provide the supplies upon request. Each dispenser is labeled in bold letters to assist the collector to choose the proper preservative for the container, i.e., METALS, MERCURY, NUTRIENTS, TOC, etc. Because the concentration levels cannot be maintained at the level collected indefinitely, maximum holding times have been set for each parameter. Analyses must be completed during the time limits set for valid results. Required containers, preservatives, and holding times for each parameter and procedures used for preserving samples are listed in the most current revisions of manuals listed in Section 2.8.2.1, *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*, and BRLSPROC108 *Sample Containers, Preservation, and Maximum Holding Times for Chemistry and Microbiological Analyses*.

The South Carolina Environmental Laboratory Certification Program is authorized by Regulation 61-81 which became effective on January 1, 1981. The Regulation applies to all laboratories which generate data for compliance with state environmental regulations or that is performing any other analyses related to environmental quality evaluations required by the Department or which will be officially submitted to the Department.

Santee Cooper Public Service Authority conducts their own monitoring program, and they collaborate with the SCDES Ambient Surface Water Quality Monitoring Program to collect certain monitoring data at certain sites at the request of SCDES. The Santee Cooper laboratory is certified under the South Carolina Environmental Laboratory Certification Program for all of the

data they collect at the request of SCDES, as well as the data resulting from their own monitoring program.

B7 ENVIRONMENTAL INFORMATION MANAGEMENT

Routine ambient surface water physical, chemical, microbiological, and algal samples are collected by Area BRLS or Aquatic Resource Monitoring personnel.
Some specific analyses are conducted in the Area Laboratories, others by the Central Laboratory, and algal samples by Aquatic Resource Monitoring staff.

Appropriate physical, hardcopy Chain-Of-Custody (COC)/analytical request sheets are filled out by the individual making the field measurements and collecting the samples. These COC/analytical request sheets are delivered to the appropriate Area Laboratory along with the samples.

Results for analyses conducted in the Area Laboratories are entered into LIMS and reported on the appropriate hardcopy COC/analytical request sheets released by the sample custodian for the area. The physical COC/analytical request sheets are sent to the ARESD in Columbia and are then sent to the appropriate program areas, Figure 2.

Samples for analysis in the Central Laboratory are shipped from the Area Laboratories via State Courier, along with copies of the COC/analytical request sheets.

All Ambient Surface Water Physical, Chemical, Microbiological, & Algal Discrete Monitoring Chain-Of-Custody/analytical request sheets are received by Aquatic Resource Monitoring Section from the Data Management Section, BRLS, both in hardcopy and electronic copy PDF form. The field data recorded on the COC/analytical request sheets are reviewed by ARMS staff, verified, edited if necessary, and stored into the IMAP database.

The retention period for ambient field/log books and original chain-of-custody sheets follows a 12-year retention period. They're either housed by the program area or with the local offices.

IMAP is an internal tool used by Area staff to schedule, track, and ensure proper sample collection for each monitoring site, and as the internal intermediate data repository before the data are pushed to WQX and eventually to the National Water Quality Monitoring Council’s Water Quality Portal water quality database at https://www.waterqualitydata.us/.

IMAP is also linked to LIMS for the purpose of identifying data to be uploaded to WQX. IMAP checks LIMS nightly to identify analytical results released by the lab each day and the newly released results are uploaded to IMAP.

The Aquatic Resource Monitoring Section performs at a minimum a 10 percent review of all field data in IMAP to ensure quality assurance of the data.

The data are uploaded at least annually to the National Water Quality Monitoring Council's Water Quality Portal water quality database at https://www.waterqualitydata.us/ as staff time permits. Data sheets are kept on file in the Aquatic Resource Monitoring.

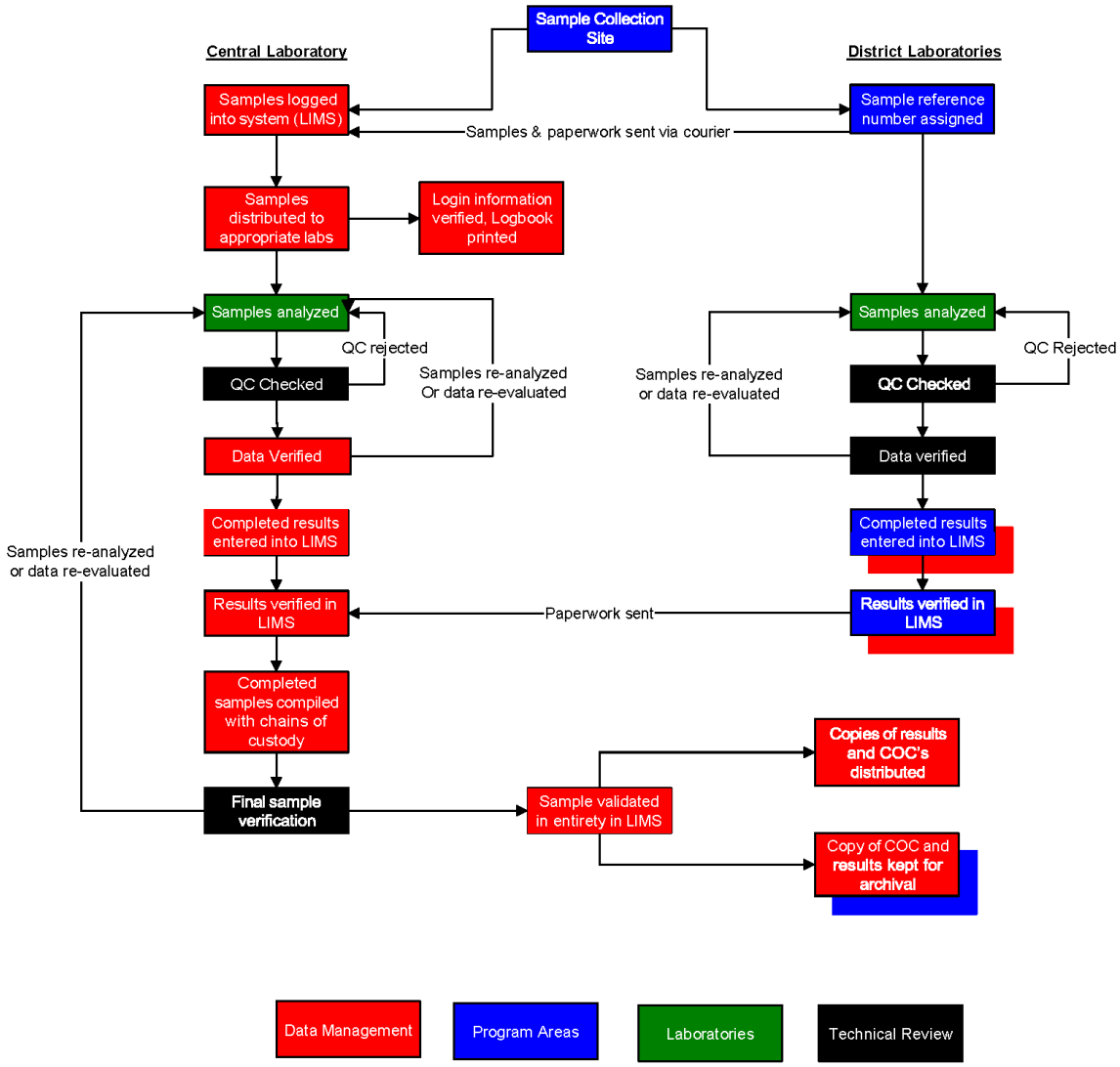

Figure 3. Ambient Discrete Monitoring Data Flow Within BRLS

C1 ASSESSMENTS AND RESPONSE ACTIONS

Audits are the principal means in this Agency's QA Program to determine compliance with established QA protocols and guidelines. A complete discussion of these audits can be found in Section 3 of the most current revision of SCDES's *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual*. The following audits are conducted by the QAM and/or designee:
Performance Audits
Data Quality Audits
System Audits

In addition, the Office of Environmental Laboratory Certification performs a certification audit on Area Laboratories (both field and stationary laboratories) at least every 3 years under both the CWA and SDWA
.
To accomplish the QA objectives cited above, the Aquatic Resource Monitoring Section has developed and instituted QAM- approved field study procedures and documentation, data review, and routine EPA operating overview. Some specifics of this Sections' QA/QC activities include:

- Submission of all Quality Assurance Project Plans (QAPPs) to the QAM and/or designee for review and approval prior to implementation. Submission of work plans as requested by the QAM. The project manager can also request reviews of work plans to ensure QA/QC requirements are addressed.

- Regular reviews and updates of SCDES's *Environmental Investigations Standard Operating Procedures and Quality Assurance Manual* and *Procedures Manual for Stream and Wastewater Facility Flow Measurement*.

- All SCDES laboratories participate in Proficiency Testing annually as a requirement for their Certification

- Field staff are required to participate in the analysis of blind QC samples or PT samples if they perform field analysis for residual chlorine, conductivity, or pH.

- Approximately every three years, EPA Region 4 Office conducts an on-site routine audit of the ARESD, the Central Laboratory in Columbia, and also reviews the Laboratory SOPs. EPA also conducts an on-site audit of all area laboratories certified for drinking water microbiological parameters each cycle. Approximately every three years the Office of Environmental Laboratory Certification performs an on-site audit that covers both drinking water and wastewater.

- Internal assessments are also performed on the Central and Area Laboratories. These are conducted by the Quality Assurance Assistants for the EA Central Laboratory; but these are not certifying audits. They are designed as an internal look at lab procedures and processes. EPA Region 4 is the certifying authority over the ARESD Laboratories.

The South Carolina Environmental Laboratory Certification Program is authorized by Regulation 61-81 which became effective on January 1, 1981. The Regulation applies to all laboratories which generate data for compliance with state environmental regulations or that is performing any other analyses related to environmental quality evaluations required by the Department or which will be officially submitted to the Department.

Santee Cooper Public Service Authority conducts their own monitoring program, and they collaborate with the SCDES Ambient Surface Water Quality Monitoring Program to collect certain monitoring data at certain sites at the request of SCDES. The Santee Cooper laboratory is certified under the South Carolina Environmental Laboratory Certification Program for all of the data they collect at the request of SCDES, as well as the data resulting from their own monitoring program.

A process for comparing the planned sampling activities against the samples and analytes collected is under development.

A ReadyOp form has been developed to document any monitoring sites not sampled or samples missed at monitoring sites at the time something is missed. These forms are sent electronically directly to ASD staff and also documented in the Integrated Monitoring and Assessment Program (IMAP) system.

Immediate questions related to sample collection while onsite in the field are directed by phone to ARMS staff.

Necessary corrective actions are determined by ARMS staff.

Laboratory issues are handled by BRLS staff.
Table 10 describes how assessment findings, non-conformance and corrective actions are documented and corrected.

Table 10. Assessment Findings, Non-Conformance, and Corrective Actions

Assessment	Frequency	Organization	Report Sent To	Corrective Action By	Corrective Action Documented Where?	Receives Corrective Action Response
Proficiency Test (PT)	1 per year	Certified Vendor	Lab Manager	Lab Manager	Laboratory Corrective Action Form / PT Records	Lab Certification Office
On-site Technical Systems Audit (TSA) for Certification	Every 3 years	Lab Certification Office	Lab Manager	Lab Manager and Analyst	Response to the Audit	Lab Certification Office

Assessment	Frequency	Organization	Report Sent To	Corrective Action By	Corrective Action Documented Where?	Receives Corrective Action Response
EPA Region 4 Oversight Audit	Every 3 years	EPA Region 4	Lab Manager	Lab Manager and Staff	Response to Audit / Corrective Action Report	EPA Region 4
Internal Audit	As needed	Regional Director	Lab Certification Office	Lab Manager and Analyst	Regional Director's Report	Lab Certification Office
Field Audit	1 per year per Regional Office	ARM Staff	ARM Manager	BRLS Program Manager and Field Staff	ARM Staff Field Audit Report	BRLS Program Manager
ReadyOp Missed Sample Form Review	As needed	BRLS Field Staff	ARM Staff	ARM Manager, ASD Director	ReadyOp Form / IMAP	BRLS Program Manager
Data Entry	Upon receipt	BRLS Lab Staff	ARM Manager	Lab Manager and Analyst	LIMS	ARM Manager
Data Validation / Release Review	Upon receipt and prior to release	ASD Staff	ARM Manager	ARM Manager / ASD Staff	IMAP / LIMS	ARM Manager

C2 OVERSIGHT AND REPORTS TO MANAGEMENT

A monthly progress update is e-mailed by the Manager of the Aquatic Resource Monitoring Section to the Director of the Aquatic Science Division. This report describes any QA issues that arise, actions taken, and general program status.

Oversight activities, response mechanisms, and problem documentation are documented in Table 10.

D1 ENVIRONMENTAL INFORMATION REVIEW

The following protocols are followed for review and verification of data use in the Ambient Water Quality Monitoring Program. Data validation and decisions regarding anomalous data are made independently for different activity's data applications.

- The analyst reviews data and QC for accuracy and completeness. Data are submitted to the Lab Manager or senior level personnel for review and data verification.

- The laboratory manager reviews all sample request sheets originating in the area for correct information and sends to the Analytical and Radiological Environmental Services Division.

- The analyst, manager, Data Management staff, or designated individual enters data into LIMS. Senior level personnel or the Data Management staff verify the transcribed data for accuracy. The Lab Director or designee releases the verified data from the laboratory and sends to the appropriate program area.

- When a particular sample fails any portion of the laboratory QC procedures, the data is notated in the LIMS according to Section IV-G of the most current revision of SCDES's *Procedures and Quality Control Manual for Chemistry Laboratories* and Section IV-E of the *Standard Operating Procedures, Microbiology Laboratory*. Samples exceeding holding times or those improperly collected will be rejected and the program area will be notified. Samples not meeting method quality control criteria is not reportable. The program is informed of the analytical error and the error is documented within LIMS as such. In the event the program requests samples to be analyzed for information only, a formal request must be made to the laboratory director in writing. This process is defined in Section II of the most current revision of SCDES's *Procedures and Quality Control Manual for Chemistry Laboratories*.

- Upon analysis completion and verification, the data is validated. After validation, data are released by the laboratory and sent to the specific program areas responsible for the original samples for final QA review.

- Internal Assessment are performed at a minimum of once each calendar year under the oversight of the Quality Assurance Assistants (QAA), who are independent of the Division. The laboratory records, process, and procedures associated with reporting compliance data results are assessed in detail to ensure compliance with quality documents, standard operating procedures, the EPA methods, and the Code of Federal Regulations. The Division is required to address issues and respond to reports resulting from these assessments within 30 days of receipt of the report. Exceptions are made for mitigating circumstances as communicated with QAA.

This process assures that the data generated and made publicly available is of known and quality. Since the purpose of this program is to collect samples and generate water quality data for the use of other program areas, data quality assessment falls upon the end data users to determine if it suits their requirements.

D2 USEABILITY DETERMINATION

The ARMS manager is responsible for final review and reporting of all Ambient Surface Water

Physical, Chemical, Microbiological, & Algal Discrete Monitoring Program results to WQX. Any results reported by the BRLS ARESD as greater than or less than the method reporting limits are reflected in the data submitted to WQX. This information is reflected in WQX and the Water Quality Portal data downloads. Any data failing the BRLS ARESD QA/QC processed discussed in Section B4 and Figure 3 are not uploaded to WQX. There are no other generated reports related to the quality of published data
.
The ARMS manager is responsible for uploading the data to WQX. Designated ARMS/ASD staff are responsible for reviewing data measured in the field.

The QA process assures that the data generated and made publicly available is of known quality. Since the purpose of this program is to collect samples and generate water quality data for the use of other program areas and individuals, data quality assessment falls upon the end data users to determine if it suits their requirements.