



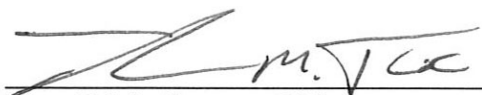
## **Quality Plan for the Watershed Data Services Section STORET Subsection**

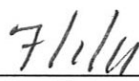
Florida Department of Environmental Protection

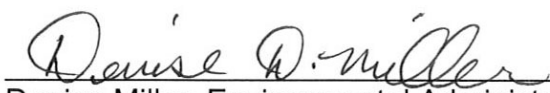
June 30, 2011

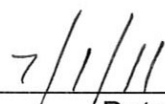
## Signature Page

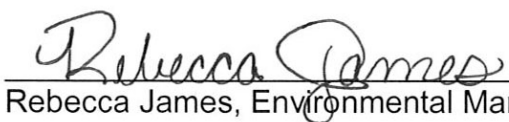
The undersigned have read and understood this Quality Plan, are charged with managing and improving the quality system and are responsible for ensuring that all staff properly execute the procedures discussed in the plan.

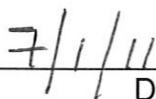
  
\_\_\_\_\_  
Tom Frick, Bureau Chief

  
\_\_\_\_\_  
Date

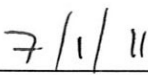
  
\_\_\_\_\_  
Denise Miller, Environmental Administrator

  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Rebecca James, Environmental Manager

  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Lisa Schwenning, Quality Assurance Officer

  
\_\_\_\_\_  
Date

## **1. Introduction**

The Florida Department of Environmental Protection (FDEP) Quality Assurance (QA) program involves the implementation of a management system (planning, review, training, and assessment) to ensure that data collection, generation, interpretation, reporting, evaluation and archiving are of sufficient quality to support Department decisions. The effectiveness of FDEP's QA program is dependent upon the actions of all FDEP staff, from "front line" employees to management, meaning QA is a function distributed throughout our organization. One aspect of our program is to ensure that Department QA activities are carried out according to commitments made to the Environmental Protection Agency as enumerated in the FDEP Quality Management Plan (QAMP) Revision 6/24/09.

In order to execute the components of the FDEP QA Directive, the Watershed Data Services (WDS) Section STORET Subsection has developed a quality plan, the purpose of which is to ensure the implementation of a quality system. This document describes the steps WDS STORET takes to ensure the scientific and legal defensibility of environmental data we manage. It describes the process of training, assessment and corrective action we undertake to ensure that environmental data meet our established quality criteria.

The FDEP Secretary is committed to implementation of the quality assurance requirements in the QAMP and as authorized at Section 403.0623 Florida Statutes (F.S.) and Chapter 62-160 Florida Administrative Code (F.A.C.) (the FDEP QA Rule for Water, Waste and Resource Management). It is the Secretary's intent to carry out these obligations and requirements as described in the Department's QA Directive (Directive 972, September 2009, at <http://www.dep.state.fl.us/admin/depdirs/directives.htm> ).

## **2. Basic Elements of the WDS STORET Quality Plan**

We expect all staff to read, understand and follow the procedures and criteria as discussed in this plan, and to carry out their assigned responsibilities for effective utilization of our quality system. This Quality Plan explains both the process and criteria by which WDS STORET's quality system is managed. The plan is utilized as an instrument of internal communication to inform our staff of current and future quality assurance activities. It describes how specific QA duties are assigned to responsible staff. We will revise our Quality Plan as needed, and will ensure the consistent application of procedures and criteria for the management of environmental data. The Quality Plan will also be used as a training document for new staff and as a reference for experienced personnel. The Quality Plan and its revisions also serve as an archival record of our formal quality system.

The elements of our plan are consistent with the Department's QAMP, QA Directive and QA Rule (Chapter 62-160, F.A.C.). Our plan addresses all activities associated with management of environmental data, including data receipt, review and storage.

## **2.1 Policy Statement**

It is the policy of WDS STORET to:

- Develop and implement the Quality System described in this document.
- Adaptively manage our Quality System to be consistent with provisions of the FDEP Quality Assurance Management Plan.
- Ensure that each individual is properly trained to execute their assigned functions.
- Implement procedures to evaluate the quality of the data we manage and to implement corrective actions when data do not meet our Data Quality Objectives.
- Perform a yearly systematic assessment of our quality assurance activities, including any corrective actions, with the findings submitted to the FDEP QA Coordinator for use in compiling the FDEP QA Report to the Secretary.

## **3. Ethics**

All employees of the FDEP WDS STORET Subsection are held to high professional ethical standards in the performance of their duties. All employees are required to read, understand and sign an 'Ethics Statement' attesting to their commitment to honesty and integrity in performance of their duties. In addition, all employees are required to attend an annual ethics training class. Improper, unethical or illegal actions will be dealt with according to the published Administrative Directives of the FDEP.

## **4. Organization and Responsibilities**

The WDS STORET Subsection resides within the Division of Environmental Assessment and Restoration (DEAR), Bureau of Watershed Restoration (BWR).

The organization of the STORET Subsection is as follows:

- Denise Miller, Environmental Administrator, Watershed Data Services Section
- Rebecca James, Environmental Manager, STORET Subsection
- Lemonteh' Horne, WQX Coordinator

- Vilma Quant, SE & Central District Coordinator
- Lisa Schwenning, SW District & Statewide Coordinator & Quality Assurance Officer
- Siteria Gregory, NW and NE District Coordinator
- Terry Frohm, S District Coordinator

Through Florida STORET, the WDS STORET Subsection implements Florida statutory requirements, FDEP rule requirements and U.S. EPA requirements for management of environmental (non-regulatory databases) data for the state. We manage data from both internal (e.g., FDEP District Offices through FDEP STORET) and external (e.g., Water Management Districts (WMDs), Counties, local governments through FLASTORET) data providers, and provide this data to internal and external users of the data through the Florida STORET data warehouse and the publicly available STORET Public Access (SPA) Website. The SPA Website is maintained by the Water Information Technology Services (WITS) Section in collaboration with WDS STORET. Management of the data in Florida STORET includes working with data providers to assist them with loading data to STORET by developing and maintaining databases and other software applications, and training data providers (e.g., on data maintenance, quality assurance and migration). We also upload the data to the U.S. EPA Water Quality Exchange (WQX) per federal requirements. Additionally, our STORET coordinators assist with database-related inquiries.

WDS STORET staff perform the following duties:

- Act as Data Provider Coordinators for FDEP, working with water quality monitoring agencies in assigned FDEP District(s) to facilitate loading of data to Florida STORET;
- Work with water quality agencies statewide to install STORET software and coordinate Florida STORET training and implementation needs;
- Coordinate with the FDEP program staff, FDEP District staff, Water Management District staff, and other Data Providers in developing and maintaining databases and other software applications that support the management of data in Florida STORET;
- Evaluate quality of data and ensure quality control of data migration to Florida STORET;
- Coordinate with the FDEP Office of Technology & Information Services (OTIS) on database issues to ensure that the Florida STORET data management program needs are met.
- Coordinate with Department Information Technology (IT) staff to design and implement database interfaces to provide for STORET data retrievals;
- Respond to requests regarding Florida STORET data retrievals;
- Provide data to U.S. EPA WQX, ensuring quality control of data uploads, and coordinate with U.S. EPA WQX staff;
- Assist with research and resolution of database related inquiries, including data quality and verification inquiries;

- Develop, implement and provide training on standards and procedures for management and quality assurance of data in Florida STORET, including the STORET Data Checker; and
- Provide feedback to the WDS STORET Subsection Quality Assurance Officer for improving the program quality system.

Staff evaluate program data using program Data Quality Objectives (DQOs) and Data Quality Indicators (DQIs) and implement corrective actions as directed by the QAO. A list of our DQOs and DQIs from our STORET Data Checker is provided in Table 1.

Responsibilities of the WDS STORET Subsection Quality Assurance Officer (QAO), Lisa Schwenning include:

- Coordinates and participates in the quality evaluation of data managed by the subsection;
- Provides oversight of staff performance of assigned QA functions;
- Ensures corrective actions are implemented for data non-conformance as determined by evaluation of the data against WDS STORET Data Quality Objectives;
- Assists program managers in the development of the Quality System and other logistical aspects of its implementation, such as coordinating training needs;
- Coordinates data reviews and documents all program QA activities, including training, data management processes, developing data quality rules, data assessments and corrective actions, and uses this information to provide reports to FDEP management, including providing information to the FDEP QA Section for use in compiling the FDEP QA Report to the Secretary.

Our QAO documents all program QA activities, including training, data management processes, developing data quality rules, data verification and corrective actions.

The WDS STORET subsection's management, Tom Frick, Denise Miller and Rebecca James, ensure that this quality system is fully operational within our program and provide general oversight. Lisa Schwenning has been designated as our Quality Assurance Officer. These four individuals also designate our Data Quality Objectives and Data Quality Indicators (see Table 1) to ensure they meet our program's needs, and periodically evaluate the effectiveness of staff's data quality activities, including reviewing audit results. They evaluate corrective action policies and procedures to be implemented when data do not meet program DQOs. Our managers review and, as necessary, discuss routine data evaluation reports with the QAO, review the annual Quality Assurance Report to be submitted to the FDEP QA Coordinator for inclusion in the FDEP QA Report to the Secretary, and discuss findings of the report with the QAO.

## 5. Training

All personnel are properly trained to perform their duties. Supervisors annually assess whether our staff performance conforms with the policies and procedures of our subsection.

Our training procedures consist of:

- Training to install STORET software and to troubleshoot errors;
- Training staff on the STORET database structure, schemas and tables;
- Training staff on the difference between U.S. EPA STORET, FLASTORET, FDEP STORET, Legacy STORET, U.S. EPA WQX, Doppler SBIO (FDEP Statewide Biological Database), and backdoor databases;
- Training staff about the FDEP Bureau of Laboratory LIMS (Laboratory Information Management System) and the Data Merge Tool (DMT) relative to STORET;
- Training staff on creating and formatting text files, importing into SIM, creating .dmp files, exporting .dmp files;
- Training staff to develop software applications for Data Provider use with STORET;
- Training staff on conducting data QA activities, including data import and migration processes;
- Training staff on use of and recommended corrective actions relative to the STORET Data Checker;
- Training staff how to document QA activities;
- Training staff on SQL for Oracle and Access;
- Training staff about applicable FDEP Rules, program area data requirements and federal reporting data requirements;
- Training staff how to use the STORET Public Access (SPA) website and QA updates and/or changes made to SPA;
- Review of ethics policy with the QAO; and
- Periodic refresher trainings or delivery of updated information, when needed.

Staff are evaluated by reviewing their performance to determine effectiveness of training. For example, after training by experienced staff, new staff are observed by experienced staff during installation of STORET software prior to allowing them to conduct software installations unassisted. Refresher training and evaluation also are conducted for experienced staff (e.g., taking a written test on SQL coding). Cross-training and evaluation also are conducted when staff exchange and test data queries written for data quality checking.

We develop and maintain a library of training SOPs for WDS STORET staff, a list of which is provided in Section 11. References.

## **6. Data Management**

WDS STORET staff understand the need to manage and evaluate the quality and usefulness of environmental data to be used in environmental assessments. We conduct the following data management procedures relative to the collection, evaluation, storage and reporting of the data in Florida STORET. Data evaluation procedures are based on our established Data Quality Objectives and Data Quality Indicators. Table 1 provides a list of the routine data quality checks we conduct. Staff evaluate data using the WDS STORET DQOs and DQIs and implement corrective actions as directed by the QAO.

WDS STORET Subsection staff install the STORET database and related software at each data provider's location. Each staff member follows protocols to ensure that the software is installed properly and functions appropriately. A set of pre-installation questions is asked of the Data Provider to ensure they meet system requirements and program requirements. The software and installation procedures are available to STORET staff on a FDEP network drive. All known errors associated with the software installation process and data import and export utilities are documented in a troubleshooting guide located on a FDEP network drive.

The WDS STORET Subsection staff develop databases and software applications that assist Data Providers in formatting and providing quality data to the Florida STORET database. During the formatting process all FDEP required fields for the identification of impaired surface waters (EAS 01-01) are implemented into the Data Provider's formatting software and STORET import configuration.

The WDS STORET Subsection staff review and evaluate data quality regularly. Each time a dataset is submitted to the STORET Subsection for upload into FLASTORET, the assigned Coordinator places the data into a local copy of the STORET database and runs quality checks on the dataset. If the dataset fails checks (refer to Table 1), the Coordinator works with the data provider to resolve the data issues (verification or corrections/additions). Once the data provider corrects the issues, an updated dataset is submitted to the STORET Subsection for upload to FLASTORET. Once the dataset passes the quality checks (verified or corrected), it is uploaded to FLASTORET. Each Coordinator also runs the data quality checks against the FDEP STORET database quarterly and works with the FDEP District Offices to verify and correct data anomalies identified by the data checker.

WDS STORET Subsection staff ensure quality control during data migration to Florida STORET. The data providers are required to send their import and migration log each time a dataset is submitted to the STORET Subsection for upload into Florida STORET. Prior to uploading the dataset into Florida

STORET, the Data loader checks the import and migration log for errors. If the logs are found to contain errors, the STORET Data Loader works with the assigned Coordinator and Data Provider to resolve the errors and attain a complete dataset. Once a complete dataset is received, it is migrated into Florida STORET. After the data have been migrated into Florida STORET, the STORET Data Loader is responsible for checking record counts on each table such that they match the record counts for each table in the log files submitted by the Data Provider. If the record counts do not match, corrective actions are taken by the STORET Data Loader to ensure complete migration of the dataset to Florida STORET.

The STORET Subsection staff ensure quality control of data uploaded to the U.S. EPA WQX database. A set of data checks has been developed to ensure Florida STORET data meet the data quality rules set forth by EPA. The data checks are run on each dataset prior to uploading data to WQX. The errors are identified and archived in an MS Excel spreadsheet that is sent to the assigned Coordinator. The Coordinator works with the Data Provider to correct issues that would prohibit the data from being uploaded to WQX. Once all issues are resolved, the data are uploaded to U.S. EPA WQX.

The STORET Subsection assists in research and resolution of dataset related inquiries prioritized by the QAO. Data generators and consumers sometimes have questions about the data in Florida STORET. All questions are researched by the assigned Coordinator. Resolution typically is dependent upon the Data Provider to answer questions about their data. The Coordinator thoroughly investigates the inquiry until a resolution is determined or all known resources for inquiry are exhausted.

Each Staff member provides a report of data management activities to the QAO weekly. These reports are compiled into a WDS STORET Subsection report that is distributed to upper management and other interested members within DEAR. These reports are archived locally by the QAO. A weekly spreadsheet is also distributed to upper management and other interested members within DEAR that details data provider communications and data uploads. This is archived on a FDEP network drive that is archived nightly. In addition, data QA activities are documented monthly in a spreadsheet located on a FDEP Network drive that is backed up nightly.

WDS STORET maintains a library of training documents accessible to data providers through the STORET ftp site during new Data Provider initiation, on the STORET webpage, and upon request. A list of documents is provided in Section 11. References.

## 7. Documentation

Since accurate documentation is an important factor for determining the success of QA activities, WDS STORET conducts the following record-keeping procedures for the indicated activities to ensure appropriate documentation:

Data import and export:

- All Data Provider import logs are archived on a FDEP network Drive that is backed up nightly
- All FLASTORET Data import logs and reports are archived on a STORET Data Loading Machine;
- All FDEP STORET Data import logs are archived on a FDEP network server that is backed up nightly;
- All STORET Data .dmp files and export logs are archived on a FDEP network drive that is backed up nightly;
- All STORET WQX export logs and processing reports are archived on a FDEP network drive that is backed up nightly.

Data review (checks of database entries):

- All Data Checker reports are archived by the assigned Coordinator;
- Counts of flagged data corrected and/or verified are archived monthly on a FDEP network drive that is backed up nightly;
- All QA activities are archived weekly in the Weekly TMDL Spreadsheet database stored on a FDEP network drive that is backed up nightly.

Data archiving:

- All data .dmp files submitted to FLASTORET are archived on a FDEP network drive that is backed up nightly;
- All data XML files submitted to U.S. EPA WQX are archived on a FDEP network drive that is backed up nightly;
- The FLASTORET, FDEP STORET, and Florida STORET Warehouse databases are refreshed and backed up nightly on FDEP network servers.

Document control:

- All documents produced by the WDS STORET Subsection are maintained and archived on a FDEP network drive that is backed up nightly.

## 8. Contract Management

BWR and WDS ensure that the FDEP contracts we administer are properly developed and managed to assure appropriate data quality. We ensure that contract development includes appropriate provisions of the FDEP Office of Technology and Information Services (OTIS) and, if applicable to the contract, provisions of the FDEP QA Rule (Chapter 62-160) and DEP-QA-002/02. WDS contracts are reviewed by the FDEP Office of Technology and Information

Services (OTIS), and, if applicable, by the FDEP QA Section prior to execution of the contract. Contract managers assure that the work is properly planned and executed, is consistent with Department Information Technology (IT) standards and requirements, and, as relevant, is consistent with the FDEP QA Rule.

## **9. Audits and Corrective Actions**

WDS STORET conducts data assessments serving the purpose of audits throughout our data management process, resulting in data verifications and/or data corrections and reporting as described under Section 6. Data Management. Data assessments are an integral part of the WDS STORET Subsection data management process for Florida STORET. The results of this integral data assessment are captured in weekly, monthly and annual data quality reporting.

## **10. Report Compilation**

To provide the Secretary with information regarding FDEP's ongoing QA efforts, WDS STORET will prepare a WDS STORET-specific QA report that describes and compiles the results of all appropriate QA activities, and will provide the report to the FDEP QA Coordinator for inclusion in the Department-wide annual QA Report to the Secretary.

## **11. References**

### General References:

- Chapter 62-160, Florida Administrative Code. Quality Assurance. Florida Department of Environmental Protection Quality Assurance Rule for Water, Waste and Resource Management. December 3, 2008.
- Chapter 62-303, Florida Administrative Code. Identification of Impaired Surface Waters. Florida Department of Environmental Protection. September 4, 2007.
- EAS 01-01. Data Quality Assessment Elements for Identification of Impaired Surface Waters. Florida Department of Environmental Protection, Environmental Assessment Section (EAS). April 3, 2001.
- DEP-QA-002/02. Requirements for Field and Analytical Work Performed for The Department of Environmental Protection under contract. Florida Department of Environmental Protection. April 15, 2002.
- Water Quality Exchange. Flow Configuration Document Version 2.0. Environmental Information Exchange Network. U.S. EPA. June 30, 2008.

### Training SOPs for WDS STORET staff:

- STORET Business Rules (STORET\_v2\_Business\_Rules\_2003\_0930.pdf)
- STORET Technical Errors (STORET\_Troubleshooting\_Guide.xls)

- SIM Technical Document (SIM v2.0.1 Technical Documentation .pdf)
- WQX Flow Configuration Document (WQX\_FCD\_v2.0)
- Data Checker Database (RList.mdb)
- Data Checker Update Process (Data Checker Update Process SOP.doc)
- Data Cleanup Process (STORET Data Cleanup SOP.doc)
- Duplicate Data Corrective Action (fixing\_dupes\_jz.doc)
- Data Checker ODBC Error Corrective Action (Datachecker\_odbc\_fix.doc)
- Data Removal Corrective Action (Creating\_large\_rollback.doc)
- Weekly Spreadsheet Process (CREATING TMDL SPREADSHEET.doc)
- FDEP STORET Create User Account (add\_user\_to\_Fdep.doc)
- Florida STORET Data Loading Process (Florida STORET Loading.doc)
- EPA WQX Data Loading Process (STORET to WQX Loading Steps.docx)
- USGS Data Loading Process (USGS\_LOAD\_DIRECTIONS.docx)DACS Data Loading Process (DACS\_Formatting\_Instructions.docx)

Training documents accessible to data providers:

#### STORET Public Access (SPA)

- How to query Stations and Results (STORET\_Walkthrough\_nomap.doc)
- How to query Stations, Results, and Search Stations by Map (STORET\_Walkthrough\_map.doc)

#### STORET and SIM Tables and Fields Definitions:

- STORET Entity Relationship Diagram (ERD.pdf)
- Table names, Entity names, and Subject area (table\_reference.xls) OR (Table\_Names\_Desc\_20.xls)
- STORET Attribute Definitions (Attribute Definition Report.pdf)
- Data Structure List with Definitions (Data Structure List with definitions.pdf)
- Data Structure List without Definitions (Data Structure List.pdf)
- STORET Business Rules (STORET\_v2\_Business\_Rules\_2003\_0930.pdf)
- STORET Standard Values (SVL\_fx22.xls)
- SIM Tables and Details of Oracle Forms Functions (SIM v2.0.1 Technical Documentation.pdf)

#### STORET SIM Import Configurations:

- Descriptions and Requirements for Results in SIM Configuration (Figure 4\_Results 2-13-02.doc)
- Descriptions and Requirements for Stations in SIM Configuration (Figure 3\_Stations 2-13-02.doc)
- Import Configuration Element Descriptions (Configuration\_Descriptions.doc)
- How to copy and load an import configuration (Directions to Copy and Load an Import Configuration.doc)

#### STORET SIM Load Data:

- How to convert tab delimited text file or excel file to pipe delimited text file (Converting Excel to Pipe Delimited Text File.doc)

- How to load import configuration and results in SIM (Load Import Configuration and Results.doc)
- SIM201 User Guides and Training (SIM201\_UserGuide.pdf and SIM Training Manual.pdf)
- How to delete an import from SIM (Deleting Import from FDEP STORET\_SIM.doc)

#### Data Entry Module:

- How to use the Data Entry Module (data\_entry\_20.pdf) & (Data Entry Module User Guide.pdf) & (Data\_Entry\_Module\_User\_Guide.pdf)
- Tutorial Exercises (Storet\_Tutorial.pdf)

#### STORET Report Module:

- Reference Document (Report\_Module\_Reference\_Guide.pdf)
- How to use the Report Module (Report\_Module\_User\_Guide.pdf)

#### DEPSIM:

- How to use DEPSIM (DEPSIM20 User Guide.pdf)

#### 20 Elements:

- What are the 20 Elements and how do they relate to STORET – a presentation about the 20 elements (VQs.ppt)
- 20 Elements description and example SIM file (EAS01-01\_help.pdf)
- Column, Column Name, Column Description, Max Length, Allowed Values and Requirements
- (DEPSIM Requirements III.xls)
- 20 Elements Help Document – Sample Data Set and Value Qualifiers (EAS01-01\_help.pdf)
- Value Qualifiers (Value\_Qualifiers.pdf) & (EAS01-01\_HelpDocument\_5Nov2009.docx)
- Rain Event Value Qualifier (RainEventSamplingnote09\_2008.doc)

#### Data Checker:

- Copy of the Data Checker dbase (RList.mdb)
- Data Checker Installation (How to Install Data Checker.doc)
- Data Checker Reports Comparison macros (Compare\_Checker\_Reports.xlsm)
- Steps to find and delete duplicate records (fixing\_dupes\_jz.doc)

#### Troubleshooting:

- STORET Errors (STORET\_Troubleshooting\_Guide.xls)
- Creating an ODBC connection Oracle and MS Access (Connecting to Oracle from MS.doc)
- Fixing Data Checker ODBC Connection Error (Datachecker\_odbc\_fix.doc)
- How to make large deletions (Creating\_large\_rollback.doc) & (rollbackfix.txt)
- Finding files that “disappear” (Getting into the elusive OLK19 folder.docx)

- Using Access 2003 VB code in Access 2007 (VB98.zip) Place folder in Microsoft Visual Studio
- Bat File Instructions
- How to Save and Run Bat Files (bat File Instructions.doc)

SQL Plus Spool:

- How to save query output using SQL Plus (How to Spool in SQLPlus.doc)

Table 1. Data Quality Objectives and Data Quality Indicators used by the Watershed Data Services STORET Subsection. DQOs and DQIs are modified as necessary to meet the requirements and objectives of Florida STORET for the FDEP Programs and Projects for which we manage data and to meet federal reporting requirements.

| Data Quality Assessment Category | CheckID | Data Quality Assessment Explanation                                                     | Source of Data Quality Check  |
|----------------------------------|---------|-----------------------------------------------------------------------------------------|-------------------------------|
| 20 Elements                      | 1       | Unit of Measurement Required for these Results - Element #4                             | Chapter 62-160.240/62-160.340 |
| 20 Elements                      | 2       | Activity Start Time Required - Element #7                                               | Chapter 62-160.240            |
| 20 Elements                      | 3       | Analysis Date Required for these Characteristics - Element #9                           | Chapter 62-160.340            |
| 20 Elements                      | 4       | Analysis Time Required for these Characteristics - Element #9                           | Chapter 62-160.340            |
| 20 Elements                      | 5       | Analytical Method Required for these Characteristics - Element #10                      | Chapter 62-160.340            |
| 20 Elements                      | 9       | Lab ID is required - Element #13                                                        | Chapter 62-160.340            |
| 20 Elements                      | 11      | No MDL Value - Element #15                                                              | Chapter 62-160.340            |
| 20 Elements                      | 12      | No PQL Value - Element #16                                                              | Chapter 62-160.340            |
| 20 Elements                      | 23      | "I", "U", or "T" Value Qualifier is present with a sample result, with a NULL MDL value | Chapter 62-160.340            |
| Date Checks                      | 1       | Activity Start or Stop Date Reported After Data Entry Date                              | Data Entry Error              |
| Date Checks                      | 2       | Analysis Dates Reported After Data Entry Date                                           | Data Entry Error              |
| Date Checks                      | 3       | Analysis Dates that are between Years 0001 and 1969                                     | Data Entry Error              |
| Date Checks                      | 4       | Activity Dates that are between Years 0001 and 1969                                     | Data Entry Error              |
| Date Checks                      | 5       | Activity Date Reported After Analysis Date                                              | Data Entry Error              |
| Date Checks                      | 6       | Activities with a Start Date that is greater than the Stop Date                         | Data Entry Error              |
| Date Checks                      | 8       | Activity Occurred after 10:00 P.M.                                                      | Data Entry Error              |
| Date Checks                      | 9       | Prep_Date Reported Before Activity Start Date                                           | Data Entry Error              |
| Date Checks                      | 10      | Prep_Date Reported After Analysis Date                                                  | Data Entry Error              |

| Data Quality Assessment Category | CheckID | Data Quality Assessment Explanation                                                                 | Source of Data Quality Check                    |
|----------------------------------|---------|-----------------------------------------------------------------------------------------------------|-------------------------------------------------|
| Date Checks                      | 11      | Prep_Date Reported After Data Entry Date                                                            | Data Entry Error                                |
| Date Checks                      | 13      | Invalid Prep_Date                                                                                   | Data Entry Error                                |
| Date Checks                      | 14      | Activity Start Time Recorded After Activity Stop Time                                               | Data Entry Error                                |
| Other Data Checks                | 1       | '0' values are not allowed for these Characteristics                                                | Based on sample Methodology (Method/Analytical) |
| Other Data Checks                | 2       | Negative values reported                                                                            | Based on sample Methodology (Method/Analytical) |
| Other Data Checks                | 3       | Results with value "**Non-detect" without a MDL                                                     | Chapter 62-160.340                              |
| Other Data Checks                | 4       | Results with value "**Present <QL" without a PQL                                                    | EAS 01-01                                       |
| Other Data Checks                | 5       | Results with value "**Present >QL" without a UQL                                                    | EAS 01-01                                       |
| Other Data Checks                | 6       | A station must have a Name and Valid Latitudes and/or Longitudes                                    | Chapter 62-160.240                              |
| Other Data Checks                | 7       | Results with a value less than or equal to Zero without a MDL                                       | EAS 01-01                                       |
| Other Data Checks                | 8       | MDL and PQL cannot equal Zero for these Characteristics                                             | EAS 01-01                                       |
| Other Data Checks                | 13      | Records where the result value equals '999','9999','99999',or '999999'                              | Data Entry Error                                |
| Other Data Checks                | 18      | Field characteristics incorrectly reported as Lab Samples                                           | Data Entry Error                                |
| Other Data Checks                | 19      | Lab characteristics incorrectly reported as Field                                                   | Data Entry Error                                |
| Other Data Checks                | 20      | These temperature characteristics should not have a medium = Water                                  | Data Entry Error                                |
| Other Data Checks                | 23      | Misuse of '**Non-detect', '**Present <QL', '**Present >QL', '**Present', '**Not Reported', '**Text' | EAS 01-01                                       |

| Data Quality Assessment Category | CheckID | Data Quality Assessment Explanation                                       | Source of Data Quality Check  |
|----------------------------------|---------|---------------------------------------------------------------------------|-------------------------------|
| Other Data Checks                | 24      | These temperature characteristics should not have a medium = Air          | Data Entry Error              |
| Other Data Checks                | 27      | Invalid UQL, PQL, or MDL values                                           | EAS 01-01                     |
| Other Data Checks                | 28      | MDL greater than the PQL Value                                            | Data Entry Error              |
| Other Data Checks                | 29      | Relative Depth populated and the Activity Depth is NULL, Negative or Zero | Data Entry Error              |
| Unit of Measure Checks           | 1       | Check field characteristics for correct units                             | Chapter 62-160.240            |
| Unit of Measure Checks           | 2       | Check nutrients for correct units                                         | Chapter 62-160.340            |
| Unit of Measure Checks           | 3       | Check bacteria data for correct units                                     | Chapter 62-160.340            |
| Unit of Measure Checks           | 4       | Check metals for correct units                                            | Chapter 62-160.340            |
| Unit of Measure Checks           | 5       | Units of measure for result and mdl do not match                          | Data Entry Error              |
| Unit of Measure Checks           | 6       | Check characteristics for correct units                                   | Chapter 62-160.240/62-160.340 |
| Unit of Measure Checks           | 7       | Check pesticide characteristics for correct units                         | Chapter 62-160.340            |
| Unit of Measure Checks           | 8       | Ratios should not have units of measure                                   | Data Entry Error              |
| Unit of Measure Checks           | 9       | Activity Depth with no Depth Units                                        | EAS 01-01                     |

| Data Quality Assessment Category | CheckID | Data Quality Assessment Explanation                                                                                                            | Source of Data Quality Check                      |
|----------------------------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|
| Duplicates                       | 1       | Results loaded into the same Activity ID with the same Characteristic Name                                                                     | Data Entry Error                                  |
| Duplicates                       | 2       | Exact duplicate rows in the result table                                                                                                       | Data Entry Error                                  |
| Value Qualifier                  | 1       | Result is less than the MDL and the Value Qualifier not equal to "T" or "U"                                                                    | Chapter 62-160.340                                |
| Value Qualifier                  | 2       | Value Qualifier "U" required for "Non-detect" results                                                                                          | Chapter 62-160.340                                |
| Value Qualifier                  | 3       | Result is equal to the MDL and the Value Qualifier not equal to "U" OR "I"                                                                     | Chapter 62-160.340                                |
| Value Qualifier                  | 5       | Result equal to *Present>QL and Value Qualifier not equal to Z or UQL is NULL                                                                  | FDEP Bureau of Laboratories & QA Section Guidance |
| Value Qualifier                  | 6       | Results with a Z qualifier or a comment of TNTC should have an Upper Quantification Limit                                                      | FDEP Bureau of Laboratories & QA Section Guidance |
| Value Qualifier                  | 7       | Bacteria Analytes over 24 hour holding time not qualified with 'Q' (using prep date minus start/activity)                                      | Chapter 62-160.340                                |
| Value Qualifier                  | 8       | Value Qualifier OR Result Comment is Z OR contains TNTC OR 'TOO NUM' and Result Value IN (100,50,10,1,0.1,0.01,0.001,0.0001)                   | FDEP Bureau of Laboratories & QA Section Guidance |
| Value Qualifier                  | 9       | Result greater than UQL, without Z in Value Qualifier field                                                                                    | FDEP Bureau of Laboratories & QA Section Guidance |
| Value Qualifier                  | 10      | Bacteria Analytes over 24 hour holding time not qualified with 'Q' (using analysis date minus start/activity date when prep date/time is NULL) | Chapter 62-160.340                                |
| Value Qualifier                  | 11      | "B" Qualifier should only be used with Microbiology Characteristics                                                                            | Data Entry Error                                  |

| Data Quality Assessment Category | CheckID | Data Quality Assessment Explanation                                                                       | Source of Data Quality Check |
|----------------------------------|---------|-----------------------------------------------------------------------------------------------------------|------------------------------|
| Value Qualifier                  | 13      | Result Value is less than or equal to the MDL with a NULL Value Qualifier Value                           | Chapter 62-160.340           |
| Value Qualifier                  | 14      | "I" in Value Qualifier field and the Result Value is not between the MDL and PQL values                   | Chapter 62-160.340           |
| Value Qualifier                  | 15      | 'J' qualified data that does not have a Result Comment in the Result Comment field                        | Chapter 62-160.700           |
| Basic WQ Outliers                | 1       | Out of Range Check for pH with the following units: NULL, None                                            | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 2       | Out of Range Check for Dissolved oxygen (DO) with the following units: mg/l, ppm                          | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 3       | Out of Range Check for Dissolved oxygen saturation with the following units: %                            | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 4       | Out of Range Check for Temperature, water with the following units: deg F, deg C                          | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 5       | Out of Range Check for Wind direction (direction from, expressed 0-360 deg) with the following units: Deg | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 6       | Out of Range Check for Depth, Secchi Disk Depth with the following units: ft, m, in                       | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 7       | Out of Range Check for Secchi disk depth (choice list)                                                    | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 8       | Law or Rule that Applies<br>Out of Range Check for Turbidity with the following units: NTU, FTU, JTU      | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 9       | Out of Range Check for Salinity with the following units: PSS , ppth                                      | Chapter 62-303.320(7)        |

| Data Quality Assessment Category | CheckID | Data Quality Assessment Explanation                                                                                                                                                | Source of Data Quality Check |
|----------------------------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Basic WQ Outliers                | 10      | Out of Range Check for Specific conductance with the following units: uS/cm, umho/cm, mho/cm, mS/cm                                                                                | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 11      | Out of Range Check for BOD with the following units: mg/l, ppm                                                                                                                     | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 12      | Out of Range Check for Chemical Oxygen Demand (COD) or Chemical oxygen demand (COD) with the following units: mg/l, ppm                                                            | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 13      | Out of Range Check for Alkalinity, Total (total hydroxide+carbonate+bicarbonate) with the following units: mg/l, mg/l as CaCO <sub>3</sub> , ppm                                   | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 14      | Out of Range Check for Alkalinity, Bicarbonate as CaCO <sub>3</sub> and Alkalinity, Carbonate as CaCO <sub>3</sub> with the following units: mg/l, mg/l as CaCO <sub>3</sub> , ppm | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 15      | Out of Range Check for Apparent and True Color with the following units: PCU                                                                                                       | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 16      | Out of Range Check for Total Suspended Solids (TSS) with the following units: mg/l, ppm                                                                                            | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 17      | Out of Range Check for Dissolved Solids with the following units: mg/l, ppm                                                                                                        | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 18      | Out of Range Check for Light attenuation coefficient and Light, underwater extinction coefficient (k) with the following units: per m                                              | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 19      | Out of Range Check for Light, transmissivity and Light attenuation at measurement depth with the following units: %                                                                | Chapter 62-303.320(7)        |

| Data Quality Assessment Category | CheckID | Data Quality Assessment Explanation                                                                                                                                                                        | Source of Data Quality Check |
|----------------------------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Basic WQ Outliers                | 20      | Out of Range Check for Light, underwater incident with the following units: uE/m2/sec                                                                                                                      | Chapter 62-303.320(7)        |
| Basic WQ Outliers                | 21      | Activity Depth is less than or equal to Zero                                                                                                                                                               | Chapter 62-303.320(7)        |
| Biological Outliers              | 1       | Out of Range Check for Fecal Coliform, Enterococcus Group Bacteria, Total Coliform, Fecal Streptococcus Group Bacteria, Escherichia coli with the following units: #/100ml, CFU, MPN, MPN/100ml, cfu/100ml | Chapter 62-303.320(7)        |
| Biological Outliers              | 2       | Out of Range Check for Chlorophyll a with the following units: None, ug/L, ppb, mg/m3                                                                                                                      | Chapter 62-303.320(7)        |
| Biological Outliers              | 3       | Out of Range Check for Chlorophyll b and Chlorophyll c with the following units: mg/m3, ug/L, ppb                                                                                                          | Chapter 62-303.320(7)        |
| Biological Outliers              | 4       | Out of Range Check for Pheophytin-a with the following units: mg/m3, ug/L, ppb                                                                                                                             | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 1       | Out of Range Check for Nitrogen, mixed forms (NH3)+(NH4)+organic+(NO2)+(NO3) with the following units: mg/l, ppm, ug/L, ppb, mg/m3, umol.                                                                  | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 2       | Out of Range Check for Nitrogen, Nitrite (NO2) as N with the following units: mg/l, ppm, ug/L, ppb, mg/m3, umol.                                                                                           | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 3       | Out of Range Check for Nitrogen, ammonia (NH3) as NH3 with the following units: mg/l, ppm, ug/L, ppb, mg/m3, umol.                                                                                         | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 4       | Out of Range Check for Nitrogen, organic with the following units: mg/l, ppm, umol, ug/L, ppb, mg/m3.                                                                                                      | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 5       | Out of Range Check for Nitrogen, Nitrite (NO2) as NO2 with the following units: mg/l, ppm, umol, ug/L, ppb, mg/m3.                                                                                         | Chapter 62-303.320(7)        |

| Data Quality Assessment Category | CheckID | Data Quality Assessment Explanation                                                                                                                                     | Source of Data Quality Check |
|----------------------------------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Nutrient Outliers                | 6       | Out of Range Check for Nitrogen, ammonia (NH <sub>3</sub> ) + ammonium (NH <sub>4</sub> ) with the following units: mg/l, ppm, umol, ug/L, ppb, mg/m <sup>3</sup> .     | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 7       | Out of Range Check for Nitrogen, Nitrate (NO <sub>3</sub> ) as NO <sub>3</sub> with the following units: mg/l, ppm, umol, ug/L, ppb, mg/m <sup>3</sup> .                | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 8       | Out of Range Check for Nitrogen, Nitrite (NO <sub>2</sub> ) + Nitrate (NO <sub>3</sub> ) as N with the following units: mg/l, ppm, umol, ug/L, ppb, mg/m <sup>3</sup> . | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 9       | Out of Range Check for Nitrogen, ammonia as N with the following units: mg/l, ppm, ug/L, ppb, mg/m <sup>3</sup> , umol.                                                 | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 10      | Out of Range Check for Nitrogen, Nitrate (NO <sub>3</sub> ) as N with the following units: mg/l, ppm, ug/L, ppb, mg/m <sup>3</sup> , umol.                              | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 11      | Out of Range Check for Nitrogen, inorganic with the following units: mg/l, ppm, umol, ug/L, ppb, mg/m <sup>3</sup> .                                                    | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 12      | Out of Range Check for Nitrogen, ammonium (NH <sub>4</sub> ) as NH <sub>4</sub> with the following units: mg/l, ppm, umol, ug/L, ppb, mg/m <sup>3</sup> .               | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 13      | Out of Range Check for Ammonia, unionized with the following units: mg/l, ppm, umol, ug/L, ppb, mg/m <sup>3</sup> .                                                     | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 14      | Out of Range Check for Nitrogen, Kjeldahl with the following units: mg/l, ppm, ug/L, ppb, mg/m <sup>3</sup> , umol.                                                     | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 15      | Out of Range Check for Phosphorus, phosphate (PO <sub>4</sub> ) as P with the following units: mg/l, ppm, umol, ug/L, ppb, mg/m <sup>3</sup> .                          | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 16      | Out of Range Check for Phosphorus, organic as P with the following units: mg/l, ppm, umol, ug/L, ppb, mg/m <sup>3</sup> .                                               | Chapter 62-303.320(7)        |

| Data Quality Assessment Category | CheckID | Data Quality Assessment Explanation                                                                                    | Source of Data Quality Check |
|----------------------------------|---------|------------------------------------------------------------------------------------------------------------------------|------------------------------|
| Nutrient Outliers                | 17      | Out of Range Check for Phosphorus, phosphate (PO4) as PO4 with the following units: mg/l, ppm, umol, ug/L, ppb, mg/m3. | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 18      | Out of Range Check for Phosphorus, orthophosphate as P with the following units: mg/l, ppm, ug/L, ppb, mg/m3, umol.    | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 19      | Out of Range Check for Phosphorus as P with the following units: mg/l, ppm, ug/L, ppb, mg/m3, umol.                    | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 20      | Out of Range Check for Phosphorus as PO4 with the following units: mg/l, ppm, umol, ug/L, ppb, mg/m3.                  | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 21      | Out of Range Check for Phosphorus, orthophosphate as PO4 with the following units: mg/l, ppm, umol, ug/L, ppb, mg/m3.  | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 22      | Out of Range Check for Sulfur, sulfate (SO4) as SO4 with the following units: mg/l, ppm, ug/L, ppb, mg/m3.             | Chapter 62-303.320(7)        |
| Nutrient Outliers                | 23      | Out of Range Check for Total Organic Carbon (TOC) with the following units: mg/l, ppm, ug/L, ppb, mg/m3, umol.         | Chapter 62-303.320(7)        |
| WQX Checks                       | 1       | Value Type is required for numeric result values                                                                       | Water Quality Exchange       |
| WQX Checks                       | 2       | Characteristic Name must be reported when there is a Result Value                                                      | Water Quality Exchange       |
| WQX Checks                       | 3       | Horizontal Collection Method is 'Interpolation-Map' and the Source Map Scale value is NULL                             | Water Quality Exchange       |
| WQX Checks                       | 4       | Characteristic Name and Status Identifier can not be NULL when there is a Result Value                                 | Water Quality Exchange       |
| WQX Checks                       | 5       | Vertical Measure reported, but unit, method and datum IS NULL                                                          | Water Quality Exchange       |
| WQX Checks                       | 6       | ActivityTypeCode contains the word 'Sample', and the SampleCollectionMethod is NULL                                    | Water Quality Exchange       |

| Data Quality Assessment Category | CheckID | Data Quality Assessment Explanation                                                             | Source of Data Quality Check |
|----------------------------------|---------|-------------------------------------------------------------------------------------------------|------------------------------|
| WQX Checks                       | 7       | Detection Limit is reported, and the Unit is NULL                                               | Water Quality Exchange       |
| WQX Checks                       | 8       | Activity Media is 'Tissue' and the Biological Intent must also be 'Tissue' (and visa-versa)     | Water Quality Exchange       |
| WQX Checks                       | 9       | ActivityTypeCode contains the word 'Logger', and the Data Logger Line Name is NULL              | Water Quality Exchange       |
| WQX Checks                       | 10      | Monitoring Location IS NULL for these Activity Types                                            | Water Quality Exchange       |
| WQX Checks                       | 11      | The Value Type & Unit can not be NULL for Numeric Results                                       | Water Quality Exchange       |
| WQX Checks                       | 12      | Duplicate Station ID's                                                                          | Water Quality Exchange       |
| WQX Checks                       | 13      | Duplicate Project ID's                                                                          | Water Quality Exchange       |
| WQX Checks                       | 14      | Sample Collection Equipment Name doesn't match the type of equipment used                       | Water Quality Exchange       |
| WQX Checks                       | 15      | Analytical Method Context does not match a valid domain list value                              | Water Quality Exchange       |
| WQX Checks                       | 16      | Method Identifier does not match a value from the Analytical Method domain list (query 1 of 11) | Water Quality Exchange       |
| WQX Checks                       | 17      | Method Identifier does not match a value from the Analytical Method domain list (query 2 of 11) | Water Quality Exchange       |
| WQX Checks                       | 18      | Method Identifier does not match a value from the Analytical Method domain list (query 3 of 11) | Water Quality Exchange       |
| WQX Checks                       | 19      | Method Identifier does not match a value from the Analytical Method domain list (query 4 of 11) | Water Quality Exchange       |
| WQX Checks                       | 20      | Method Identifier does not match a value from the Analytical Method domain list (query 5 of 11) | Water Quality Exchange       |

| Data Quality Assessment Category | CheckID | Data Quality Assessment Explanation                                                                                                     | Source of Data Quality Check |
|----------------------------------|---------|-----------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| WQX Checks                       | 21      | Method Identifier does not match a value from the Analytical Method domain list (query 6 of 11)                                         | Water Quality Exchange       |
| WQX Checks                       | 22      | Method Identifier does not match a value from the Analytical Method domain list (query 7 of 11)                                         | Water Quality Exchange       |
| WQX Checks                       | 23      | Method Identifier does not match a value from the Analytical Method domain list (query 8 of 11)                                         | Water Quality Exchange       |
| WQX Checks                       | 24      | Method Identifier does not match a value from the Analytical Method domain list (query 9 of 11)                                         | Water Quality Exchange       |
| WQX Checks                       | 25      | Method Identifier does not match a value from the Analytical Method domain list (query 10 of 11)                                        | Water Quality Exchange       |
| WQX Checks                       | 26      | Method Identifier does not match a value from the Analytical Method domain list (query 11 of 11)                                        | Water Quality Exchange       |
| WQX Checks                       | 27      | Method Identifier does not match a value from the Analytical Method domain list (query 12 of 11)                                        | Water Quality Exchange       |
| RI Checks                        | NA      | Multiple Checks are in the database but will not be listed here since they are all the same. These checks ensure referential integrity. | Referential Integrity        |