

# 4

## Data Management and Reporting

### Data Management and Reporting

#### 4.1 Data Management

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### 4.1 Data Management

The Monitoring Plan details activities that will generate a large amount of data in a variety of forms. This section describes procedures and requirements for handling and managing that data in all of its forms. The following flow chart (Figure 4.1-1) is a generalized example of where data is being collected and the process it goes through before being reported. Data types collected and stored for the project will include:

- Field Data (geological, geophysical, ecological, bathymetric, survey)
  - Non-Automated
    - Field Logs
    - Sampling Forms
    - Calibration/Maintenance Forms
    - COC Documentation
  - Photodocumentation
- Long-term Automated Data
  - Groundwater and Surface Water Parameters
  - Meteorological Measurements
  - Rainfall Measurements
  - Flow Measurements
- Non-Direct Measurements Survey Logs
  - Plant Operation Logs
- Laboratory Data
- Project Reports and Documents

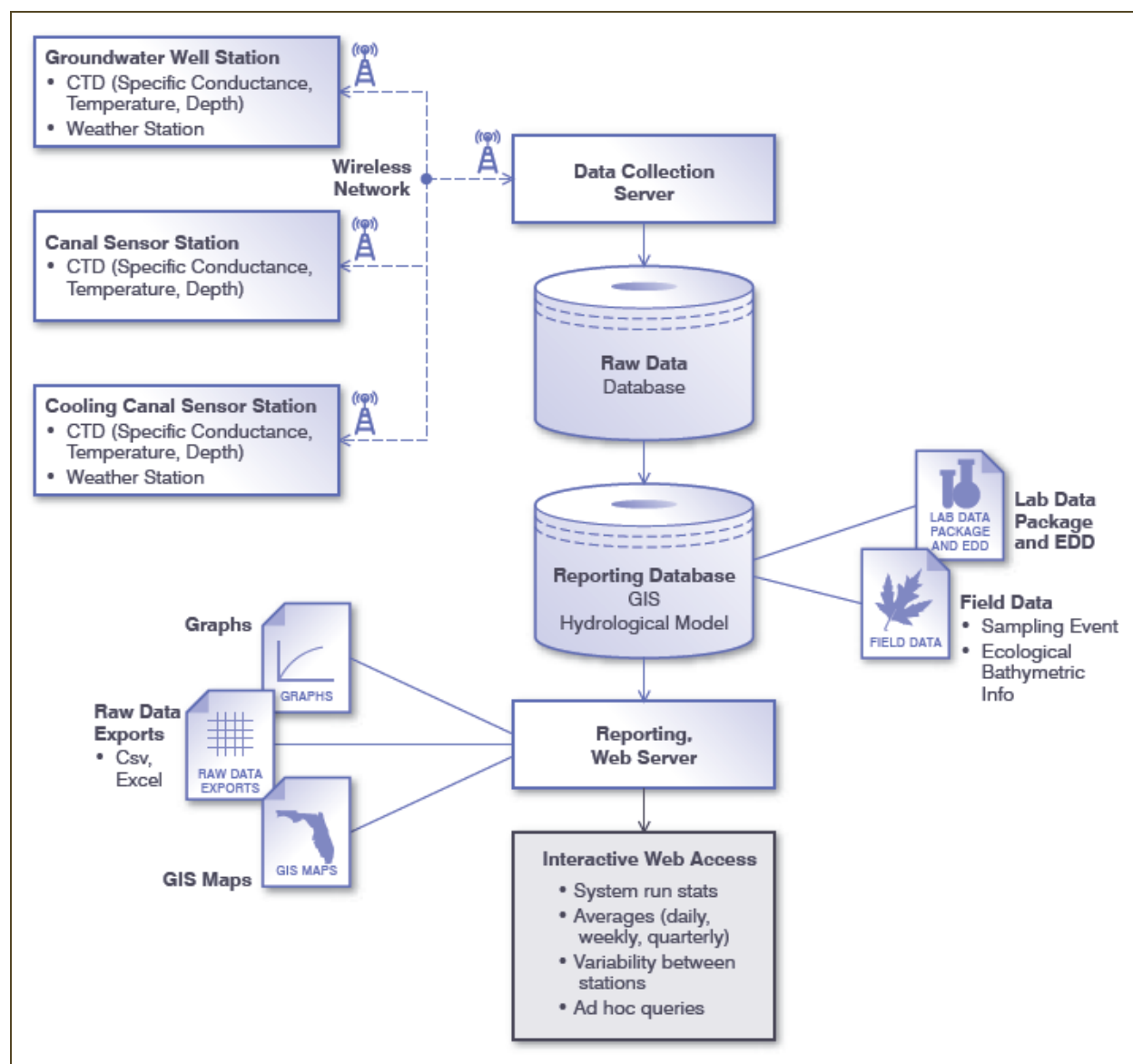


Figure 4.1-1. Data Flow Chart

### 4.1.1 Field Data Management

Field data consists of the non-automated readings/notes recorded during field activities, photodocumentation, and automated data. Non-automated data are acquired in the field either by direct observation or by sensors and manually recorded. Photodocumentation is digital photos of the sampling area and event. Calibration and maintenance logs are separate sheets on which data collected during sampling events and routine maintenance are recorded. Automated data are data collected by field instruments, recorded in a data logger or equivalent device, and transmitted via telemetry or stored on-site for later data retrieval. The following is a description of data management and review protocol for the project based on requirements in DEP QA-002/02.

#### 4.1.1.1 Non-Automated Data

Non-automated data consists of logbooks,, sampling records, COC forms, maintenance and calibration logs, GPS data files, and any other data forms recorded by the field team. Field teams will collect this data and are responsible for field QC procedures described in Section 2 of this QAPP. As soon as practical, field data records will be reviewed for correctness and completeness, validated using the qualifier codes in Table 4.1-1. by FPL project staff or contractors, scanned and uploaded to the pre-designated place in the FPL project database. copies of all original handwritten logs, data sheets, etc., shall be stored in the database. In the event that original field sheets/records are lost, replacement records may be used providing that all such records are identified.

**4.1-1. Field Qualifier Codes (FAC 62-160.700 Table 1)**

Tags	Definition
D	Measurement was made in the field (i.e., in situ). This applies to any value (except pH, specific conductance, dissolved oxygen, temperature, total residual chlorine, transparency, or salinity) that was obtained under field conditions using approved analytical methods.
E	Indicates extra samples were taken at composite stations.
J	Estimated value.
R	Significant rain in the past 48 hours. (Significant rain typically involves rain in excess of ½ inch within the past 48 hours.) This code will be used when the rainfall might contribute to a lower than normal value.
!	Data deviate from historically established concentration ranges.

#### Automated Data Processing Tool (ADaPT) Field Electronic Data Deliverable (EDD) Requirements

Field parameter data shall be provided to the laboratory by FPL. This can be in the form of groundwater sampling logs or a summary of the final parameter results. The required fields are listed in Appendix D. The laboratory shall use the data to create an Automated Data Processing Tool (ADaPT)/Water Assurance and Compliance Systems (WACS) format field EDD and provide it to FPL with the other ADaPT required EDDs. ADaPT was developed by FDEP to standardize electronic deliverables and provide a way to review the EDD for completeness and perform secondary checks and review of the data. The FDEP tool aids data users in performing an accelerated review and assessment of analytical data.

#### 4.1.1.2 Photodocumentation

As soon as possible after the field effort is completed, the field team members will review the photos in the file against the photo log to be sure that the notes correspond to the appropriate photographs, then the photos and the log will be uploaded into the project database. File names for the photo files in the database will correspond to the picture names/numbers given in the log book or photo log.

#### 4.1.1.3 Automated Data Management

As described in Section 2.4.1, groundwater and surface water stations are equipped with sensors to measure specific conductance, temperature, and stage in-situ. Data from each automated station will be collected at 15-minute intervals from the top of each hour. That data will then be uploaded to the project database daily via telemetry or stored on-site and uploaded to the database at appropriate intervals.

Rainfall and other meteorological data (temperature, solar radiation, wind speed, wind direction, and relative humidity) will be collected at 15-minute intervals to help determine the amount of rainfall entering into and evaporating from the CCS (Section 2.8). The data will be stored on-site and downloaded daily from the instruments into the central database for use in calculations.

Acoustical Doppler current meters will be used to measure velocity (i.e., flow) remotely located throughout the CCS. Data collected from the current meters will be collected at 15-minute intervals and electronically uploaded daily whenever possible.

The equipment will be programmed to collect data as specified in the Monitoring Plan. Once uploaded, the data will be checked for completeness and adherence to expected values. If the data is incomplete or does not fall in the expected range of values, corrective actions will be taken to correct any instrument or data recording problems. Both the raw data and the checked data will be maintained by FPL (or their designee). The retention of this data will adhere to the specification in Section 4.3 (Data Storage and Custody).

The automated data will be checked, validated, and qualified using the QA/QC procedures as stated in SFWMD-SOP Q 115 § 5 and 6. These qualifiers, detailed below, will be used to maintain consistency between this Monitoring Plan's dataset and that of the SFWMD.

#### 4.1-2. Telemetry Data Qualifiers in the Project Database

Tags	Tag Description	Definition
A	Accumulated	Reserved for manually observed precipitation data accumulated over a period exceeding 24 hours.
C	Cleaning/Calibration	Tagged at the point where a Cleaning and/or Calibration occurred.
J	Estimated	Designated estimated data. "J" tags are converted to "M" codes when data cannot be reasonably estimated.
G	Calculated	Calculated data. Applies primarily to water level data where Reference Levels and Pressures have been adjusted/corrected.
M	Missing	Reserved for missing data, data not recoverable and, when valid, reference stations are not available for estimations.
N	Not processed	Not yet available (i.e., data did not load to database, and needs to be reloaded).
P	Summary computed from partial record	Computed from partial record.
X	Included in next amount marked 'A'	"X" tags are used for manually observed precipitation data accumulated over a period of more than 24 hours. "X" tags are a fraction of an aggregated precipitation quantity tagged "A." "X" tags precede "A" tags, where the accumulation total is given.

**4.1-2. Telemetry Data Qualifiers in the Project Database**

Tags	Tag Description	Definition
!	“Normal” limits exceeded	Indicate instances when normal data values have been exceeded.
?	Reject (questionable, do not use)	Indicates questionable data (data appears suspect or questionable), not to be used. Temporarily tag data “M” and apply missing data rule. <u>Note:</u> It is advised not to use this data except if there is a solid reason to do so.
<, >	Less than / Greater than	Less than “<” tags or greater than “>” tags are designed to flag data when the physical limit of the sensor has been reached.

**4.1.2 Non-Direct Measurements**

Historical and reference data for the area will be tapped into as needed to help assess results on a regional scale and fill in data gaps, as necessary. Data from non-direct measurement may come from various sources including but not limited to the following:

- Physical information such as descriptions of sampling activities and geologic logs;
- State and local environmental agency files;
- Reference computer databases and literature files; and
- Historic reports on a site.

Data from non-direct measurements will be reviewed by competent personnel for accuracy and applicability. The specifics for the review process will depend on the type of data to be reviewed. Data from all non-direct measurement sources will be stored as project data in the manner indicated in Section 4.3.

**Geo-Referenced Data Sets/Secondary Data**

Secondary data sets include geo-referenced data from sources such as aerial images, public Geographic Information System (GIS) layers, and data from related projects. Any data from outside sources will include a description of the data, a reference to the source, and the date it was updated. Outside data will be checked prior to use to verify that current values are used and that geo-referenced data area accurate. The checks will include spatial data validation of points using high-resolution, 1-foot, ground pixel orthophotography of the area. At least 95% of coordinate points should fall within National Map Accuracy Standards when overlaid on known quality map features of similar accuracy.

**4.1.3 Laboratory Data Management**

Laboratory data shall be reviewed on several levels. The first levels of review are performed by the laboratory. These include reviewing the data for completeness and accuracy and compiling the reviewed data into a laboratory data package for submission to FPL. The laboratory reporting requirements are detailed in the Sections 4.1.4.1 and the laboratory data review requirements are in Section 4.1.4.2, below.

The next level of review, data assessment, is performed by FPL or an independent reviewer appointed by FPL. This includes the validation of the laboratory data against the criteria established in this QAPP and preparing a summation of the validation results to accompany the data. Data assessment procedures are detailed in Section 4.2

Results reported for non-standard methods (i.e., isotope analyses) cannot be supported by ADaPT. The isotope deliverables will have to be reviewed manually (Section 4.3).

For FDEP purposes, all required records listed in 62-160, FAC will be available for review if requested for auditing and shall be retained by FPL for the duration of the plant's operation. In addition, the laboratory SOP's and Quality Manual are provided in Appendix E of this QAPP.

#### **4.1.3.1 Laboratory Reporting Requirements**

Upon completion of the analyses, the laboratory shall compile the results in a data package to be submitted to FPL. The data package will contain the case narrative and required reportable data described in F.A.C. 62-160. The data package will be submitted in hard copy or Adobe Acrobat electronic copy along with the required EDDs. All files associated with the deliverable shall be transferred to FPL by the laboratory via the web portal. The laboratory shall notify FPL when the upload is complete.

##### **Case Narrative**

Although not described in F.A.C. 62-160, the laboratory will complete a case narrative for each sample data group submitted. The case narrative will briefly but concisely include the identification and description of all deviations from the analytical method, the laboratory's QA plan and SOPs, and Section 3 of this QAPP. The case narrative will also include identification of all instances in which QC measure results failed to meet acceptance criteria along with a brief, but complete, description of the QC measure involved, the acceptance limit, and the value for the QC measure that was outside of acceptance limits. Descriptions in the case narrative should include the samples affected by the problem(s)/anomalies and the direction and estimated magnitude of the bias, if possible. The case narrative shall include a description of what corrective actions were taken by the laboratory for all quality control activities that did not meet acceptance criteria. The case narrative will be substantively complete enough to provide the independent data reviewer with enough information to be able to independently assess the magnitude of the potential inaccuracy or imprecision, the direction of potential bias, and other potential effects on the quality or documentability of the reported results based on the technical review by the laboratory.

##### **Required Reportable Data**

The NELAC laboratory data package released by the laboratory (the laboratory data package) will contain, in addition to the case narrative, the following required data:

- EDD (including a printed and signed copy of the EDD files);
- Signed and dated laboratory data package;

- Identify all laboratories providing results to the data package;
- Client site name and project number;
- Completed COC documentation;
- Sample identification cross-reference;
- Sample receipt, preparation, and analysis information;
- Test reports for environmental samples and field QC samples;
- Instrument calibration data;
- Laboratory blank sample data;
- LCS data;
- MS/MSD data;
- Laboratory duplicate data;
- ICS, post-digestion spike (PDS), and/or serial dilution (SD) results (if applicable);
- MDL/RL data;
- Original analysis records (raw data); and
- Problems and/or anomalies observed by the laboratory (described in the case narrative).

Specifications of the reportable data to be delivered within the laboratory data package detailed in F.A.C. 62-160.340 and summarized below:

### **Laboratory Data Package**

The final and complete version of the laboratory data package shall be signed and dated by the laboratory QA officer or designee before submission to FPL. This will be uploaded to the web portal and the laboratory shall notify FPL when the data package is available. If electronic signatures are used, the laboratory shall follow the guidelines set forth in F.A.C. 62-160.405 for electronic signatures.

### **Electronic Data Deliverable (EDD)**

Electronic records that provide input to data validation may be referred to as EDDs. For this project, EDDs shall be submitted in the ADaPT format. This includes three text files; the lab analytical data, the lab receipt data, and the field data. A fourth EDD will be required for the gross alpha analysis. A detailed table of laboratory and field EDD requirements and protocols are provided in Appendix D. The laboratory shall sign and date a copy of the final EDD text files and submit a hard copy (or Adobe .pdf) of the signed EDDs with the deliverable package to FPL.

### **Multiple Laboratories**

It is anticipated that several laboratories will be required to meet all the analytical requirements of the project. The laboratory compiling the final deliverables submitted to FPL



shall identify all subcontracted laboratories providing results for the project. NELAC certification shall be provided for subcontracted labs performing NELAC certifiable methods. The original reports from the subcontracted laboratories will be provided in the final deliverable for review.

### **Completed Chain of Custody (COC) Documentation**

The laboratory data package shall include copies of the COC forms completed by the field samplers. Additional information to be supplied includes field sample identification, date and time of sample collection, method of preservation, analytical methods requested and/or analytes requested, signature of at least one member of the field personnel having custody of the samples prior to delivery to the laboratory, signature of laboratory personnel receiving the samples, sample condition upon receipt including temperature upon receipt, presence/condition of COC seals on coolers/samples and other pertinent log-in information, as applicable, such as missing samples, broken containers, etc.

### **Sample Identification Cross Reference**

The laboratory data package shall include a listing of all field sample identification numbers (sorted alphanumerically) cross-referenced to the associated laboratory sample identification numbers. This listing shall also include the laboratory batch number(s) associated with each sample analysis reported in the data package. The data package will include an easy and unambiguous means by which all of the field samples associated with a specific QC sample (e.g., the laboratory duplicate, the MS/MSD samples, and the LCS) can be identified.

### **Sample Receipt, Preparation, and Analyses**

The laboratory data package shall include information regarding the state of the samples as they were received at the laboratory. This shall include the state of custody seals, container temperatures, sample bottle integrity, and sample preservation (if applicable). The laboratory shall also document preparation batches and the project samples associated with each batch as well as the specific analytical batch information. Preparation and analysis dates and methods performed shall be documented.

### **Test Reports for Environmental Samples and Field QC Samples**

The laboratory shall report all project sample results with the following information at a minimum:

- Project sample and lab sample identification;
- Preparation date, method, and batch;
- Analysis date, method, and batch;
- Reporting units;
- Dilutions;
- MDL and RL information (adjusted for dilutions if necessary); and
- Qualifier codes (if applicable).



The laboratory data package shall include the annotated test reports for all samples including field samples, dilutions, and re-analyses from which data are being reported. Analytical results shall be reported on a dry weight basis for soil and sediment samples with the percent solids (or percent moisture) also reported on the test reports to allow back-calculation of the result on a wet weight basis.

Detected results (adjusted for sample characteristics, sample preparation, and/or laboratory adjustments) greater than the MDL that meet the qualitative identification criteria specified in the analytical method shall be reported; results between the MDL and the RL will be flagged to indicate the compound is present but the reported value is estimated. Non-detected results shall be reported as less than (<) the value of the MDL.

### **Instrument Calibration Data**

The laboratory data package shall include initial and continuing calibration supporting data, when applicable, according to the EPA method or laboratory SOP. This will include a copy of the results for each level of calibration, the linear range, and the correlation coefficient or response factor. It should be clear as to which standards (files) were used in the calibration, the number of standards, and if any points were deleted to attain an acceptable correlation coefficient. The equations presented shall be complete and use enough significant figures to reproduce the analytical results during data validations.

### **Internal Standard (IS) Recovery Data**

The laboratory data package shall include internal standard recovery data summaries for analyses that utilize this technique. Instrumental drift as well as suppressions or enhancements of instrument response caused by the sample matrix must be corrected by the use of internal standards (ISs). ISs are measured amounts of certain compounds added after preparation or extraction of a sample. ISs ideally should have similar analytical behavior to the elements being determined. ISs must be present in all samples, standards, and blanks at identical levels. The masses of the internal standards selected for the analysis shall bracket the expected analyte mass range.

### **Laboratory Blank Sample Data**

The laboratory data package shall include test reports or summary forms for all blank samples (e.g., method and preparation blanks) pertinent to the sample analyses. If a target analyte was detected in any of the blanks associated with an analytical and/or preparation batch that includes samples from the project, the type of blank, the level of the contamination, the environmental samples affected, and the potential effect on the associated data will be described in the case narrative. Blank sample test reports will contain all of the information required for sample test reports (e.g., surrogate recoveries). Sample data shall not be blank corrected. Results for blank analyses for which the blank does not go through the method preparation and extraction procedures, such as solvent blanks, system blanks, calibration blanks, etc., may be reported on blank summary forms instead of on test reports.

### **Laboratory Control Sample (LCS) Data**

The laboratory data package shall include the LCS test reports or LCS results summary forms. The LCS will be taken through the entire preparation, cleanup and analysis procedure.

The LCS samples shall contain all chemicals of concern identified in the site-specific work order. When the chemicals of concern are not identified for the project, the LCS will contain all analytes for which data are reported. The LCS test report, or LCS results summary form, shall include the amount of each analyte added to the sample, the amount measured during the analysis, the percent recovery (%R) between the amount added and the amount measured, and QC limits for each analyte in the LCS. If applicable to the laboratory's QA plan and/or SOPs, the %R and RPD data for each analyte in the laboratory control sample duplicate (LCSD) will be reported.

#### **Matrix Spike/Matrix Spike Duplicate (MS/MSD) Data**

The laboratory data package shall include the MS/MSD test reports or summary forms. The MS/MSD samples shall be spiked with all chemicals of concern identified in the site-specific work order. The MS/MSD test reports or results summary forms will include identification of the compounds in the spike solution, the amount of each compound added to the MS and the MSD, the parent sample concentration, the concentration measured in both MS and MSD, the calculated %R, the calculated RPD, and the QC limits for both %R and RPD. The form shall also include the laboratory batch number and the identification number of the sample spiked. The data package will include an easy and unambiguous means by which the samples associated with that particular MS/MSD can be identified, such as a sample identification cross-reference table.

The MS/MSD summary form shall identify whether the sample selected for the MS/MSD analyses was from the project. If a non-project sample is used for the MS/MSD analysis, the case narrative will provide the justification (e.g., "non-project sample spiked. Lab received insufficient project sample volume for MS/MSD"). When either, or both, MS/MSD recovery and precision are outside of QC or advisory limits, the case narrative will include the actual recovery/precision values and a brief description of measures taken by the lab in attempt to alleviate the interference.

#### **Laboratory Duplicate Sample Data**

If an analytical duplicate (or laboratory duplicate) sample is analyzed, the laboratory data package shall include the duplicate sample test report or analysis summary form. The duplicate sample test report or analysis summary form shall include the calculated RPD between the sample and the sample duplicate results and the QC limits for the RPD. The test report or summary form shall also include the laboratory batch number and the identification number of the sample spiked. The laboratory data package will include an easy means by which the samples associated with that particular duplicate analysis can be identified.

#### **Interference Check Sample (ICS)**

ICS analysis is applicable to ICP-MS and ICP-Atomic Emission Spectroscopy (AES) analysis. The laboratory data package shall include ICS analysis results when applicable. The ICS results will include all analytes in the standard and their respective %R. The applied method contains the QC acceptance criteria for ICS results.

**Serial Dilution (SD)**

SD analysis may be pertinent to metals analysis by ICP-AES, ICP-MS, and GFAAS. The ICP SDs are run to help evaluate whether or not significant physical or chemical interferences exist due to the sample matrix. The laboratory data package shall include SD analysis results when performed. When analyte concentrations are sufficiently high (the concentration in the original sample is minimally a factor of 50 above the instrument detection limit [IDL]), the results obtained from a five-fold dilution of the original sample are compared to the original results by means of a percent difference (%D).

**Post Digestion Spike Data**

Post digestion spike analysis may be pertinent to metals analysis by ICP-AES, ICP-MS, and GFAAS. The laboratory data package shall include post digestion spike analysis results when applicable. The analyte recoveries obtained for post digestion spike analyses will be compared to the acceptance range for accuracy contained in the method. Under some circumstances, laboratories will quantify results by the MSA to compensate for low post digestion spike recovery. The low spike recovery will not compromise the accuracy of the results, as the standards used in the MSA analysis are spiked directly into the sample.

**Method Detection Limits (MDLs) and Reporting Limits (RLs)**

The laboratory data package shall include the MDL and RL for each chemical of interest specified in the Monitoring Plan or, when the chemicals of interest are not specified, each analyte included in the laboratory's initial calibration standard mixture(s). The RL should be 5 to 10 times the MDL for the majority of target analytes, but no lower than 3 times the MDL. See Section 3.2 for requirements related to acceptable concentrations for the MDL.

**Original Analysis Records**

The laboratory data package shall include the original analysis records, or raw data, for all analyses. This shall include all supporting documentation required to reproduce the analysis reported results.

**4.1.3.2 Laboratory Data Review**

The laboratory shall perform reviews of the following three elements: the data package, the EDD, and the data upload.

The data package review has the initial responsibility for the correctness and completeness of the data. The laboratory will evaluate the quality of the analytical data based on an established set of laboratory guidelines (laboratory QA plan and SOPs) and this QAPP. The laboratory will review the data packages to confirm the following:

- Sample preparation information is correct and complete;
- Analysis information is correct and complete;
- The appropriate SOPs have been followed;
- Analytical results are correct and complete;

- QC sample results are within established control limits;
- Blank results are below detection limits;
- Analytical results for QC sample spikes, sample duplicates, initial and continuous calibration verifications of standards and blanks, standard procedural blanks, laboratory control samples, and ICP interference check samples are correct and complete;
- Tabulation of reporting limits related to the sample is correct and complete; and
- Documentation is complete (all anomalies in the preparation and analysis have been documented; holding times are documented; qualifiers have been added where appropriate).

The laboratory shall perform the in-house analytical data reduction and QA review under the direction of the laboratory manager or designee. The laboratory is responsible for assessing data quality and advising of any data that were rated "preliminary" or "unacceptable," or other notations that would caution the data user of possible unreliability. Data reduction, QA review, and reporting by the laboratory will include the following:

- Raw data produced by the analyst will be processed and reviewed for attainment of QC criteria as outlined in this QAPP, the laboratory Quality Assurance Plan, and/or established EPA methods and for overall reasonableness.
- The data reviewer will check all manually entered sample data for entry errors and will check for transfer errors for all data electronically uploaded from the instrument output into the software packages used for calculations and generation of report forms and will decide whether sample re-analysis is required.
- The laboratory will review initial and continuing calibration data, and calculation of response factors, surrogate recoveries, MS/MSD recoveries, post-digestion (analytical) spike recoveries, internal standard recoveries, laboratory control sample recoveries, sample results, and other relevant QC measures.
- Upon acceptance of the preliminary reports by the laboratory data reviewer, the laboratory QA officer (or their designee) will review and approve the data packages prior to the final reports being generated. The data reduction and the QC review steps will be documented, signed, and dated by the analyst.

The following table of data qualifier codes and descriptions is from F.A.C. 62-160.700. These qualifier codes shall be applied to data by the laboratory when appropriate.

**Table 4.1-3. Laboratory Data Qualifier Codes and Definitions**

Qualifier	Definition
A	Value reported is the arithmetic mean (average) of two or more determinations. This code shall be used if the reported value is the average of results for two or more discrete and separate samples. These samples shall have been processed and analyzed independently. Do not use this code if the data are the result of replicate analysis on the same sample aliquot, extract or digestate.

Table 4.1-3. Laboratory Data Qualifier Codes and Definitions

Qualifier	Definition
F	When reporting species: F indicates the female sex.
H	Value based on field kit determination; results may not be accurate. This code shall be used if a field screening test (i.e., field gas chromatograph data, immunoassay, vendor-supplied field kit, etc.) was used to generate the value and the field kit or method has not been recognized by the Department as equivalent to laboratory methods.
I	The reported value is greater than or equal to the laboratory method detection limit but less than the laboratory practical quantitation limit.
J	Estimated value. A “J” value shall be accompanied by a detailed explanation to justify the reason(s) for designating the value as estimated. Where possible, the organization shall report whether the actual value is estimated to be less than or greater than the reported value. A “J” value shall not be used as a substitute for K, L, M, T, V, or Y, however, if additional reasons exist for identifying the value as an estimate (e.g., matrix spiked failed to meet acceptance criteria), the “J” code may be added to a K, L, M, T, V, or Y. Examples of situations in which a “J” code must be reported include: instances where a quality control item associated with the reported value failed to meet the established quality control criteria (the specific failure must be identified); instances when the sample matrix interfered with the ability to make any accurate determination; instances when data are questionable because of improper laboratory or field protocols (e.g., composite sample was collected instead of a grab sample); instances when the analyte was detected at or above the method detection limit in a blank other than the method blank (such as calibration blank or field-generated blanks and the value of 10 times the blank value was equal to or greater than the associated sample value); or instances when the field or laboratory calibrations or calibration verifications did not meet calibration acceptance criteria.
K	Off-scale low. Actual value is known to be less than the value given. This code will be used if: 1. The value is less than the lowest calibration standard and the calibration curve is known to be non-linear; or 2. The value is known to be less than the reported value based on sample size, dilution or some other variable. This code will not be used to report values that are less than the laboratory practical quantitation limit or laboratory method detection limit.
L	Off-scale high. Actual value is known to be greater than value given. To be used when the concentration of the analyte is above the acceptable level for quantitation (exceeds the linear range or highest calibration standard) <u>and</u> the calibration curve is known to exhibit a negative deflection.
M	When reporting chemical analyses: presence of material is verified but not quantified; the actual value is less than the value given. The reported value will be the laboratory practical quantitation limit. This code will be used if the level is too low to permit accurate quantification, but the estimated concentration is greater than the method detection limit. If the value is less than the method detection limit use "T" below.

Table 4.1-3. Laboratory Data Qualifier Codes and Definitions

Qualifier	Definition
N	Presumptive evidence of presence of material. This qualifier shall be used if: 1. The component has been tentatively identified based on mass spectral library search; or 2. There is an indication that the analyte is present, but quality control requirements for confirmation were not met (i.e., presence of analyte was not confirmed by alternative procedures).
O	Sampled, but analysis lost or not performed
Q	Sample held beyond the accepted holding time. This code will be used if the value is derived from a sample that was prepared or analyzed after the approved holding time restrictions for sample preparation or analysis.
T	Value reported is less than the laboratory method detection limit. The value is reported for informational purposes only and shall not be used in statistical analysis.
U	Indicates that the compound was analyzed for but not detected. This symbol will be used to indicate that the specified component was not detected. The value associated with the qualifier will be the laboratory method detection limit.
V	Indicates that the analyte was detected at or above the method detection limit in both the sample and the associated method blank and the value of 10 times the blank value was equal to or greater than the associated sample value. Note: unless specified by the method, the value in the blank shall not be subtracted from associated samples. V qualifier applied to method blanks only; J qualifier applies to all other blanks.
Y	The laboratory analysis was from an improperly preserved sample. The data may not be accurate
?	Data are rejected and should not be used. Some or all of the quality control data for the analyte were outside criteria, and the presence or absence of the analyte cannot be determined from the data
*	Not reported due to interference

The laboratory has the responsibility for verifying the correctness and completeness of the electronic deliverables by performing the ADaPT EDD Review. The laboratory QA section shall perform a QA check on 100% of data key-punched into EDDs and will perform a 5% spot-check of data electronically transferred into an EDD for consistency with hard copy deliverables.

All EDDs shall be submitted in the FDEP ADaPT format. Once the EDD files have been created, the laboratory shall run them through ADaPT to ensure completeness. QC checks using ADaPT will be performed on each laboratory data EDD. The QC checks must ensure that field and laboratory QC data are acceptable and that the format for each data type is consistent with the data base attributes and elements (Appendix D). The EDD is imported into the ADaPT data checker and compared to a library consisting of a set of valid values. If needed, the laboratory shall coordinate with FPL to develop a project specific library of methods and acceptance criteria. This project-specific library will be based on FDEP valid values and the methods and criteria specified in this QAPP.

Any ADaPT-defined critical errors shall be corrected by the laboratory before uploading to FPL. The laboratory shall enter a comment or explanation for any other errors identified by ADaPT in the EDD error log.



Once the laboratory has completed the EDD check and generated the required reportable data, the laboratory shall upload the files to the FPL password-protected web portal and provide FPL with notification of completed upload. The laboratory will coordinate with FPL on the specific reporting procedures. FPL (or its designated contractor) shall review the data package upload to the centralized database to ensure that the loading process was successful and that the loaded data are accurate and complete.

## **4.2 Data Assessment**

The following procedures meet all the requirements for data assessment in DEP-QA-002/02, Requirements for Field and Analytical Work.

### **4.2.1 Field Data Assessment**

Data collected by field crews, including but not limited to geophysical, geological, ecological, water quality, bathymetric, and land survey data, will be reviewed by each entity collecting the data. The reviewer will confirm the method of data collection and note any deviations. Data will be reviewed for completeness, comparableness, and representativeness. When applicable, accuracy and precision will be assessed. Any calibration exercises and QA/QC procedures will also be assessed to confirm the data is valid and appropriate.

The exact procedures to assess the data will vary by data type and will be based on the degree of analysis required to interpret the data. For example, survey data will essentially require a review using the procedures briefly discussed above. Borehole geophysical results will require the interpretation of the optical survey and flow logs along with consideration of the other geophysical data to determine the location of well screens. Field sheets for ecological data (species composition, Braun Blanquet Cover Assessment, plant stem length, soil and porewater nutrient content) will be checked for completeness prior to leaving the site; as a QA check, at least 5% of plots (in the marsh and mangroves) or 1 site per Bay transect (i.e. 1 out of 8 sites) will be re-measured or re-surveyed by a second biologist for consistency; any discrepancies are discussed and a final QA recorded. Data will be digitized into Microsoft Access or Excel; to ensure accuracy in data entry, all data entered will be verified against the field sheets by a second individual. Data sheets and log books will be scanned and uploaded to the FPL database.

All procedures employed for field data assessment will be discussed in the semi-annual or annual reports.

### **4.2.2 Automated Data Assessment**

The goal of QA/QC is to help ensure that environmental decisions supported by remotely sensed data are as reliable, consistent, and accurate as possible given the variety of automated technologies that may be applied. Table 2.4-1 contains the QC requirements for the automated data collection equipment. These include accuracy criteria for specific conductance, temperature, and stage (water level). Surface water and groundwater data acceptance criteria are detailed in Section 2.4.3. These include criteria for availability, reliability, maintainability, completeness, and timeliness.



The automated data collection equipment will be checked for accuracy after installation and before readings are accepted. The instruments will be verified on a bi-monthly schedule. This schedule may be adjusted depending on the stability of the instruments. The automated instruments will be verified by performing a continuing calibration verification. For specific conductivity this includes placing the probe in a known solution prior to cleaning and comparing the value of the probe to the concentration of the known solution. If the probe reading is within 5% of the calibration solution, then the probe data subsequent to the previous calibration is deemed acceptable and the probe passes its continuing calibration verification. The probe is then cleaned and calibrated for specific conductivity. If the probe reading fails the continuing calibration verification, the previous data will be qualified as estimated (J). If the probe does not pass an initial calibration or initial calibration verification, it will be replaced. However, if the probe is not replaced, all ensuing data based on that calibration will typically be qualified as estimated (J).

Temperature sensors on the probes can be verified but not calibrated. Prior to cleaning, the probe will be placed in a container with water and the temperature reading on the probe will be compared to reading on a NIST thermometer. If the reading of the probe and NIST thermometer are within 0.5°C of each other, the probe data subsequent to the previous continuing calibration verification is deemed acceptable. If the difference is greater than 0.5°C, the data will typically be qualified as estimated.

Similar to temperature, sensors measuring water level can be verified but not calibrated in the field. In essence the continuing calibration verification is a check of the instrument calibration conducted in the factory and to confirm placement of water level probes. Stage data will typically be verified by physical measurement and computation of level surface elevation during calibration events. Based on procedures refined during the first year of data gathering, manual reading of water levels will be made with a water level indicator prior to pulling a probe for cleaning. The manual readings will be compared to with the probe reading and if the difference is equal to or less than 0.10 foot, the probe data subsequent to the previous continuing calibration verification is deemed acceptable. If the difference is greater than 0.10 foot, the previous data will typically be qualified as estimated. However in some instances the data may be qualified as questionable depending on the results. Also if there is evidence the probe was not properly reset, there was an error in setting a reference level, or a survey elevation is incorrect, the water levels may be corrected and qualified as calculated (G).

As data will be uploaded via telemetry more frequently than the calibration verification schedule, the incoming data shall be reviewed once a month with a more detailed assessment following verification/calibration events. An examination of the data will be performed through graphical plotting (daily, historical and monthly). Gaps, overlaps, outliers and relationships are depicted. The source stage, temperature, and specific conductance data set will be plotted and examined with at least three adjacent vicinity stage stations, whenever possible, for the period-of-interest of the data being analyzed.

All data uploaded to the FPL database shall undergo an electronic review of 100% of the data and reviewed against acceptance criteria. An initial acceptance criterion will be established based on historic data and seasonal considerations and refined every three months as more data becomes available. This will be used to determine the normal operating range and help identify

data outliers that require more careful scrutiny. If any new datum gathered is outside that range, it will be flagged by the system and FPL will receive notification.

The equipment readings will be monitored to determine if the result was an anomaly or if the equipment has drifted out of calibration. If unexplainable out-of-range readings are recorded, (more than 72 hours of readings) for a particular instrument, the instrument will be verified on site by a field technician. If the reading is verified, the data flags will be removed and the instrument will continue in service. If the reading cannot be verified, the instrument will be checked, repaired, and recalibrated on-site or must be replaced. In cases where the unexplained out-of-range readings occur and cannot be verified, the data will be qualified as questionable (?). Availability guidelines for the automated equipment state instruments shall be repaired or replaced within 72 hours to maintain the acquisition of data.

To validate the automated sensor readings subsequent to the previous calibration, the instrument calibration will be verified on a bi-monthly schedule. If the instrument calibration is verified as acceptable, as described in Table 2.4-2, then sample results are considered acceptable. If data are not acceptable, then the values may be qualified per the telemetry qualifiers (Table 4.1-2). A second, calibrated, hand-held field instrument will be used during the quarterly sampling events to measure field parameters and water levels to confirm the accuracy of the automated readings.

#### **4.2.2.1 Automated Flow and Meteorological Data Assessment**

Equipment specifications, verification procedures, and acceptance criteria are addressed in Section 2.7 for Automated Flow Data Collection and in Section 2.8 for Automated Meteorological Data Collection.

The data assessment associated with these activities shall include a review of the station conditions, the instrument calibration (and verification) procedures and results, if applicable, and the data collection, documentation, and management procedures discussed in their respective sections. Also, the assessment shall include a review of the applicable data quality objectives (accuracy, availability, reliability, maintainability, completeness, and timeliness) for compliance with the QAPP specifications.

Flowmeter QA will be performed annually by the manufacturer. Streamgauging will be conducted at approximately the same time during the year as the initial gauging efforts. The K-factor (ratio of true average velocity to SL500 measured velocity) for each site will be determined and compared against the previous year's values. If the K-factor between years has changed more than 5%, the data will be corrected for drift.

The assessment of flow, meteorological and rainfall data, shall include the use of graphical plots to analyze for outliers. Meteorological and rainfall data will be compared to data from other stations nearby as well. Historical data shall be used to establish value minimums, maximums, and seasonal variations and patterns. Data shall be plotted against time, typically a period of at least one month, to analyze for instrument drift, failures, and anomalies. Data may be reviewed against weather data from the surrounding area collected from other Agencies, such as NOAA and SFWMD, and the NEXRAD database. Additional assessment procedures are detailed in SFWMD SOP's Q115 (Meteorological) and Q202 (Rainfall) that deal with outlier

determination and missing or estimated data. Table 4.2-1 below, adapted from SFWMD SOP Q115, provides some factors to consider when assessing these data.

Table 4.2-1. Factors Affecting Measurements

Qualifier	Definition
Temperature	Air temperature sensors are susceptible to slow calibration drifts as well as spuriously high or low temperature extremes. Temperatures that routinely exceed the recorded extremes (historical data) for a region may indicate a problem with either the sensor or with the radiation shield used to house the sensor. Precipitation events, air mass changes and unusual wind conditions may also cause extreme temperature deviations. Debris and insect nests may clog the temperature sensor and radiation shield; this most likely will manifest itself by dampening the changes in temperature.
Relative Humidity	The relative humidity sensor is located within a ventilated radiation shield. If the shield or the sensor itself becomes clogged with debris, it may trap moisture and may skew the data. It may also dampen the changes in humidity. The radiation shield may also lose some of its reflective properties resulting in dryer than normal conditions. During high humidity conditions, the sensor may report values greater than 100%. The accuracy of most modern-day electronic RH sensors is generally within $\pm 5\%$ RH, thus recorded RH values in excess of 105% provide good evidence that the sensor is out of calibration. <b>All RH values in excess of 100% should be set equal to 100% prior to use in the evapotranspiration (ET) computation process.</b>
Barometric Pressure	The atmospheric (barometric) pressure sensor is most susceptible to slow calibration drifts over a long period of time. This is best identified through field calibration checks and by comparing the data against nearby sites. Spikes can also occur in the pressure data. With the stability of the pressure data, it is easy to detect the majority of spikes that occur. Debris, insect nests, etc., may also obstruct the pressure sensor, this most likely will manifest itself by reducing the rate of pressure change.
Wind	Site selection for wind sensors must be carefully planned to avoid errors from the surroundings. Trees located next to weather stations can create turbulence. It is possible that birds may occasionally block the ultrasound frequencies of ultrasonic wind sensors (e.g., recording wind speeds in excess of 100 mph when no apparent wind event is present). Examining wind gust data will help to identify any skewed data (e.g., any period with a no-signal will have a wind gust of 100 mph). Missing data may be caused by instrumental failure due to birds, thunderstorms, or other unexpected events. Missing data will degrade the performance of modeling results. Rain has negative effects on wind measurements.
Solar Radiation	Variations in solar radiation data are primarily limited to such factors as obstruction in the surrounding area, environmental problems, equipment problems (e.g., instrumentation is out of calibration, dead battery, condensation build-up), and human error. For sites with net radiometers, net radiation is often difficult to measure because the sensors are problematic to maintain and calibrate. The net radiometer domes, made of soft transparent polyethylene, shield the sensors from moisture, wind, or debris that could affect sensor performance. Problems encountered include crushing by hail, pecking by birds, and gradual deterioration of the polyethylene. If net radiation is measured, then care and attention must be given to the calibration of the radiometer, the condition of the vegetative surface over which it is located, maintenance of sensor domes, and level of the instrument.
Rain	The measurement of rainfall is very sensitive to exposure, and in particular to wind. Tipping-bucket rain gauges tend to under-measure rainfall during high intensity events because of splashout of rain from the collector. The physical obstructions such as trees and buildings located in the immediate vicinity of rain gauge influence the rainfall data. Also, changing weather conditions, such as wind speed or wind direction during the rainfall event, impact the rainfall data. Data measurement errors could come from contamination (birds, spider webs, squirrels, debris, etc.), malfunction of instruments including power surge, power failure, and required maintenance/re-calibration.

Data qualifiers specified in Section 4.1.1.3 will be added to data as appropriate by the reviewer. Data will be reviewed monthly for drift and anomalies and summarized in semi-annual and annual reports.

#### **4.2.2.2 Automated Data Assessment Reports**

Raw data is posted in “Data and Documents” tab in the FPL web data base. This raw automated data will be reviewed after the end of each month and, following validation/qualification, will be posted on the FPL web portal for Agency access in the Query Builder Tab. The finalized (validated) data will be presented in the semi-annual and annual reports. These reports will include summaries of sensor results, field verification information, DQO summary, and data qualifiers, if necessary. Flow data and mass balance assessments will be presented along with the calculation methodology in these same reports.

#### **4.2.3 Laboratory Data Assessment**

The data review processes to be used by the independent data reviewer (i.e., the person independent of the laboratory who is reviewing and qualifying the data) shall follow the FDEP’s A Tiered Approach to Data Quality Assessment, DEP-EAS- 00-01(Oct 2000), for laboratory data verification and validation guidelines. Laboratory data is reviewed according to levels, or tiers, with each building on the one before. Based on the tiers described in the guidance document, the procedures and data checks performed by ADaPT are equivalent to a Tier 2. A Tier 2 review verifies the data are entered as required and performs an efficient electronic review of the data that include:

- Holding times;
- MDLs;
- Sample preservation;
- Data qualifiers;
- Range checks;
- Reversals (technical comparisons);
- Technical consistency comparisons (charge balance, ions versus conductivity, etc.);
- Blank contamination (both field and laboratory);
- Control and matrix spike accuracy and precision; and
- Duplicate precision.

For the purposes of this project, the calibration anomalies reported in the case narrative will be applied to the applicable data. Calibration review is normally reserved for a Tier 3 review as described in EAS 00-01. Initial and continuing calibration QC failures have the potential to affect multiple project samples and should be part of the Tier 2 review for all laboratory data.

The next level of review, Tier 3, is a more extensive review of the laboratory data. A Tier 3 review includes all the elements of the Tier 2 ADaPT review plus a review of the hard copy deliverables and recalculation of 10% of manual calculations for accuracy. A Tier 3 review includes:

- Calibration standards, correlation coefficients, and frequency;
- Preparation and analysis logs;

- Tuning results;
- Internal standard results; and
- Laboratory studies (such as MDLs and correction factors).

A Tier 3 assessment shall be performed on all NELAC laboratory analytical data submitted for the project.

The deliverables for the non-standard analyses will not be supported by ADaPT. ADaPT has a specific list of FDEP-approved methods that are supported. Non-standard methods are not listed on the ADaPT approved methods list. The isotope analyses for various matrices (Appendix B) fall into this category. As the data will not be verified by ADaPT, a Tier 3 review shall be performed on 100% of the non-standard method data packages.

The results of the data assessments will be summarized in a data usability summary (DUS) described in Section 4.2.3.2 below.

#### 4.2.3.1 Data Validation

The following procedures meet all the requirements for data validation and assessment in DEP-QA-002/02, Requirements for Field and Analytical Work.

Once the laboratory data files are uploaded to the FPL web portal, the validator designated by the FPL PM shall access the files and run the EDDs through ADaPT with the project-specific library. An error log is produced for any anomalies detected. The laboratory will have run the ADaPT error check and provided comments or reasoning for the errors. If critical errors are encountered or any errors exist that cannot be readily explained, the laboratory shall be notified to correct the error and resubmit the EDD.

Once all critical errors are corrected and all other errors are either corrected or explained, technical consistency comparisons can be made which include analyzed TDS versus calculated TDS, TDS versus conductivity, major ions versus conductivity, and analytical reversals (i.e. total phosphorous versus ortho-phosphate). ADaPT qualified data will provide a reason code explaining the source of the qualification. A summary of these codes is provided in Table 4.2-2 below.

**Table 4.2-2. ADaPT Reason Codes for Data Review Qualification**

Qualifier	Definition
Q1	Sampling to Analysis Holding Time
Q2	Sampling to Extraction Holding Time
Q3	Extraction to Analysis Holding Time
V	Method Blank
S	Surrogate Recovery
M1	Matrix Spike Recovery.

**Table 4.2-2. ADaPT Reason Codes for Data Review Qualification**

Qualifier	Definition
M2	Matrix Spike RPD
D	Lab Duplicate RPD
L1	LCS Recovery
L2	LCS RPD
G	Method Detection Limit
W1	Field Blank
W2	Equipment Blank / Rinsate
W3	Trip Blank
P	Replicate RSD

The laboratory(s) and FPL PM (or their designee) will be contacted with regard to any missing or incorrect deliverables in the data packages noted during the validation process. The data reviewer will document all subsequent submittals and re-submittals from the laboratory, recalculations, and data reviewer corrections. The full deliverable data package will be reviewed for compliance with method specifications. Method non-compliances identified during the review, professional judgments used, and conclusions reached concerning usability of non-compliant data will be described in the DUS. These reports will also describe the results of the sample-specific review and the impact on the quality and usability of the data.

The laboratory established quality control criteria shall be used to review data for accuracy and precision. The laboratory may use the criteria stated in the specific method of analysis. The method summary tables in Section 3.2 include method acceptance criteria for laboratory QC samples (blanks, calibration, LCS, MS, and duplicates). If stated in the method, the laboratory can establish internal acceptance criteria based on replicate analyses. The laboratory may also establish acceptance criteria for parameters when they are not sufficiently detailed in the methods. When laboratory limits are established, they shall be used for data review and validation.

Laboratory QC limits for non-standard methods are listed below in Table 4.2-3 for aqueous samples and Table 4.2-45 for biota samples. These criteria are established by the respective laboratories doing the analyses specified in Appendix B.



**Table 4.2-3. Laboratory QA Objectives for Non-Standard Methods / Aqueous Samples**

Analyte	Precision	QC Description
$^3\text{H}$		2 diluted NIST Stds per batch of 16 (14 samples), tritium-free water std
$^2\text{H}/^1\text{H}$	$\pm 2\text{‰}$	Reference gas, Standardization
$^{18}\text{O}/^{16}\text{O}$	$\pm 0.07\text{‰}$	Reference gas, Standardization
$^{13}\text{C}/^{12}\text{C}$	$\pm 0.1\text{‰}$	Reference gas, Standardization
$^{87}\text{Sr}/^{86}\text{Sr}$	$\pm 0.001\%$	70 ratios, Rb correction, fractionation correction, Standardization

**Table 4.2-4. Laboratory QA Objectives for Non-Standard Methods / Biota Samples**

Analyte	Precision	QC Description
$^{13}\text{C}/^{12}\text{C}$	$\pm 0.1\text{‰}$	Internally calibrated isotope std every 10 samples, Reference gas, Standardization
$^{15}\text{N}/^{14}\text{N}$	$\pm 0.1\text{‰}$	Internally calibrated isotope std every 10 samples, Reference gas, Standardization

Table 4.2-5 below present the data validation qualifier definitions and qualifier codes that may be used by the data review person during the validation process. The qualifier codes listed therein, from F.A.C. 62-160.700, are required for consistency of use in the database.

**Table 4.2-5. Data Validation Qualifier Codes<sup>1</sup>**

Code	Definition
U	The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
J	Estimated value. A "J" value shall be accompanied by a detailed explanation to justify the reason(s) for designating the value as estimated. A bias is assigned if discernable.
V	Indicates that the analyte was detected at or above the method detection limit in both the sample and the associated method blank and the value of 10 times the blank value was equal to or greater than the associated sample value. Only for method blank and J qualifier for other blanks.
?	Data are rejected and should not be used. Some or all of the quality control data for the analyte were outside criteria, and the presence or absence of the analyte cannot be determined from the data.
Code	Bias
+	Bias is high.
-	Bias is low.

### Metals, Inorganic, and Nutrient Analyses

Metals data from ICP-MS, ICP, or cold vapor/atomic absorption (CVAA), analyses, other inorganic (i.e., anionic data from IC) and nutrient (i.e., nitrogen, phosphorous), data will undergo

evaluation from the reported results for the sample-specific criterion using the specifications given in the following subsections.

### **Holding Times**

The holding times and sample temperatures will be compared to the holding time and sample temperature requirements contained in Table 2.6-1 of this QAPP. Results for analyses not performed within holding time limits will be qualified “Q.” If the holding time is grossly exceeded for mercury (more than two times the holding time limit) the data will be qualified with a “Q” and the reviewer should use professional judgment to evaluate the need to reject non-detectable results.

### **Initial Calibration (IC)**

The acceptance criteria specified in the respective method shall be used to evaluate the initial calibration. If the Case Narrative or data validation process indicates that the initial calibration for any analyte did not meet the acceptance criteria, then all results for that given analyte associated with the initial calibration will be qualified as estimated (“J”).

### **Continuing Calibration Verification**

Method or laboratory specific acceptance criteria shall be used to evaluate continuing calibration verification results. If the data validation process indicates that the initial or continuing calibration verification for any analyte did not meet the acceptance criteria, then all results for that given analyte associated with the initial or continuing calibration verification will be qualified as estimated (“J”).

### **ICP ICS for Metals**

The respective method specifies the QC acceptance criteria for interference check standards (ICS) analysis for metals analysis methods covered under this QAPP.

If the %R for analytes present in the ICS sample is above the upper acceptance criterion, then results reported as detected for that analyte in associated samples for which the potentially interfering elements were present at concentrations equivalent to or greater than those present in the ICS sample will be qualified as estimated (“J”).

If the %R for analytes present in the ICS sample is less than the lower acceptance criterion, then both detected and non-detected results for that analyte in associated samples for which the potentially interfering elements were present at concentrations equivalent to or greater than those present in the ICS sample will be qualified as estimated (“J”).

If the analytes not actually present in the ICS sample are reported at concentrations for which the absolute value of the concentration is greater than the sample quantitation limit for the analyte, then the potential effect and magnitude of the bias will be evaluated for all associated samples for which the potentially interfering elements were present at concentrations equivalent to or greater than those present in the ICS sample. If the concentration is reported as a positive value and the magnitude of the ICS sample result represents more than 25% of an associated sample result reported as detected, then the associated sample result will be qualified as estimated (“J”) with a potential high bias. Nondetectable results will not require qualification. If

the concentration is reported as a negative value and the absolute value of the magnitude of the ICS sample result represents more than 25% of an associated sample result (or sample quantitation limit for non-detects), then the associated sample result will be qualified as estimated (“J”).

### **Internal Standards**

The analysis of internal standards determines the existence and magnitude of instrument drift and physical interferences. The EPA National Functional Guidelines specifies the QC acceptance criteria for internal standards for Method 200.8. No other project analyses specify the use of internal standards.

The absolute response of any one internal standard must not deviate more than 60 to 125% of the original response in the calibration blank. If the internal standard recoveries are below the lower acceptance limit, then results reported as detected or not-detected shall be qualified as estimated (“JH/UJ”). If the internal standard area counts are above the upper acceptance limit, then results reported as detected shall be qualified as estimated (“JL”).

### **Blanks**

Criteria for evaluating blank results are provided in the DEP-EA-001/07. The results for equipment blanks, preparation blanks, and calibration blanks, and other blanks reported in the data package will be reviewed. If the associated sample matrix is a solid; positive rinsate, calibration, and other associated aqueous blank results will be converted to equivalent concentrations in the solid samples by assuming that all contamination found in the aqueous blank aliquot analyzed is potentially present at up to ten times that amount in the solid sample aliquot analyzed. Sample results for analytes detected in an associated preparation blank at concentrations less than ten times the equivalent blank concentration will be qualified as “V” at the reported concentration. Negative blank concentrations will be evaluated for potential effects (low bias) on sample data when the absolute value of the negative concentration is greater than the MDL. If the negative concentration in a blank may potentially have produced more than a 25% effect on a reported sample result or sample quantitation limit, the associated sample result will be qualified as “V.” For example, if the blank result is -2 mg/L; the MDL is 1 mg/L and the associated sample result is 5 mg/L; the sample result will be qualified since a potential low bias of 2 mg/L represents 40% of the reported concentration and the absolute value of the blank concentration is greater than the MDL. Preparation blanks are associated with all samples prepared with that sample (preparation batch). Continuing calibration blank samples are considered to be associated with all samples back to the previously analyzed continuing calibration blank sample and up to the next continuing calibration blank sample in the analytical run. The “V” qualifier is specific to preparation blank contamination, while the “J” qualifier will apply to contamination in all other blank types.

### **Laboratory Control Sample (LCS)**

Criteria for evaluating LCS results are provided in the respective method or established by the laboratory. The analyte recoveries obtained for LCS analyses will be compared to analytical method requirements and to the acceptance ranges contained in summary tables in Section 3.2.. All analytes specified in the analytical method should be spiked into the LCS. Data associated with LCS recoveries outside the acceptance range will be qualified as follows:

- If the LCS recovery for an analyte is greater than the upper acceptance limit, suggesting a potential high bias in reported results, all positive results for that analyte in all associated samples will be qualified as estimated (“J”) whereas nondetect results will be considered to be acceptable for use without qualification because the high bias does not affect non-detected results.
- If the LCS recovery for an analyte is less than the lower acceptance limit but >30%, suggesting a potential low bias in reported results, positive and nondetect results for that analyte in all associated samples will be qualified as estimated (“J”).
- If the LCS recovery for an analyte is <30%, positive sample results will be qualified as estimated (“J”) whereas nondetect results will be qualified as unusable (“?”) for all associated sample results.

### Matrix Spike (MS) Analysis

Criteria for evaluating blank results are provided in the respective method. The analyte recoveries obtained for matrix spike (or matrix duplicate) analyses will be compared to the acceptance range contained in the summary tables in Section 3.2, for cases in which the native sample concentration is less than four times the spike concentration. Recovery calculations are not required if the concentration added is less than 30% of the sample background concentration. The reviewer should also be aware that a matrix spike recovery may be outside acceptance limits when the parent sample is quantified by method of standard additions but the matrix spike is not. In such a case, the matrix spike recovery may not be an appropriate measure of accuracy. Data associated with matrix spike recoveries that are outside the acceptance range will be qualified as follows:

- If the MS recovery for an analyte is greater than the upper acceptance limit, suggesting a potential high bias in reported results, all positive results for that analyte in the sample used for the MS/MSD will be qualified as estimated (“J”) whereas nondetect results will be considered to be acceptable for use without qualification.
- If the MS recovery for an analyte is less than the lower acceptance limit but >30%, suggesting a potential low bias in reported results, positive and nondetect results for that analyte in the sample used for the MS/MSD will be qualified as estimated (“J”).
- If the MS recovery for an analyte is <30%, positive sample results will be qualified as estimated (“J”) whereas nondetect results will be qualified as unusable (“?”) for that analyte for the sample used for the MS/MSD.

No qualification of associated samples in the batch or data package will be performed on the basis of matrix spike recoveries alone. The data reviewer should use professional judgment and consider the results of other QC measures, such as LCS recoveries, in conjunction with MS/MSD results for other batches to determine the need for qualification of associated samples.

### Duplicate Analysis

Criteria for evaluating field duplicate results are provided in the DEP-EA-001/07. Results for the duplicate sample (laboratory duplicate or MSD) analyses will be compared to the acceptance criteria of  $\leq 20\%$  for aqueous matrices and  $\leq 40\%$  for all other matrices. Precision

criteria for non-standard analyses are listed in Tables 4.2-3 and 4.2-4, above. The QC RPD limits are for field duplicate pairs with concentrations reported at or above the PQL. Sample results meeting this criterion with RPD's greater than project limits, are qualified as estimated, J.

Samples with reported analyte concentrations above the MDL but below the PQL can produce greater variability, leading to greater RPD's. RPD values are non-representative when the following conditions exist:

- One or both results are less than the PQL.
- One or both results are qualified as estimated or rejected or are suspected of blank contamination.
- One or both results are not detected.

### **Post-Digestion Spike for Metals**

The analyte recoveries obtained for post-digestion spike analyses will be compared to the acceptance range for accuracy in the respective method. Under some circumstances, laboratories will quantify results by the method of standard additions to compensate for low post-digestion spike recovery. As such, the low spike recovery would not indicate poor accuracy. However, if the result for the sample on which the post-digestion spike analysis is performed is not obtained by the method of standard additions and the post-digestion spike recovery is outside of the acceptance limits, the result for the sample on which the post-digestion spike is run will be qualified based on the following guidance:

- If the recovery is above the upper acceptance limit, detectable results will be qualified as estimated ("J"). No action will need to be taken for non-detects.
- If the recovery is below the lower acceptance limit but greater than or equal to 30%, detectable and non-detectable results will be qualified as estimated ("J").
- If the recovery is less than 30%, detectable results will be qualified as estimate ("J") and reject ("V") non-detectable results.

The data reviewer should use professional judgment in conjunction with other QC sample results, such as matrix spike recoveries, to determine the need for qualification of results for other samples (if any) associated with the post-digestion spike analysis.

### **ICP Serial Dilution (SD)**

ICP serial dilutions are run to help evaluate whether or not significant physical or chemical interferences exist due to sample matrix. When analyte concentrations are sufficiently high (the concentration in the original sample is minimally a factor of 50 above the IDL) the results obtained for a five fold-dilution of the original sample are compared to the original results by means of a %D. The %D is compared to a precision acceptance limit of the respective method. If the absolute value of the percent difference between the diluted and original result is greater than the stated limits, all results for that analyte in that sample delivery group (SDG) are qualified as estimated ("J"). Generally, the diluted result can be considered to be the more accurate result, as long as the diluted concentration is well above the detection limit. Therefore,

the data reviewer can generally discern a potential bias direction from a comparison of the diluted and undiluted results.

### **Field Duplicate**

Criteria for evaluating field duplicate results are not provided in the analytical methods. Therefore, the following criteria will be used for validation of homogenized or collocated field duplicate results for all analyses based on DEP-EA-001/07. Where both the sample and duplicate values are greater than the PQL, acceptable sampling and analytical precision is indicated by an RPD for the two field duplicate results of less than or equal to 20% for aqueous matrices and 40% for all other matrices. If the above criteria are not met for an analyte, all associated sample data for that analyte will be qualified as estimated (“J”). Where one or both analytes of the field duplicate pair are less than the PQL, RPD is not calculated.

### **Review of CCS Tracer Suite Analysis Data**

For the validation of barium and total iron in the CCS tracer suite, use the validation procedures for metals analyses outlined in Section 4.1.3.1, Metals and Inorganic Analyses, above. The DIC analysis will be reviewed by the procedure outlined in the following section, Data Review of Other Analyses.

A standard method for the analysis of the stable isotopes ( $^3\text{H}$ ,  $^2\text{H}/^1\text{H}$ ,  $^{18}\text{O}/^{16}\text{O}$ ,  $^{13}\text{C}/^{12}\text{C}$ , and  $^{87}\text{Sr}/^{86}\text{Sr}$ ) in the CCS tracer suite is not available. Alternative methods, not already approved by FDEP or EPA, are necessary to provide the project required data. The methods are summarized in Section 3 and detailed in Appendix B. All project data from non-standard methods shall undergo a Tier 3 assessment.

Data are evaluated relative to compliance with specific method requirements. In addition, radiochemistry data are evaluated based on the relationship between the result, the uncertainty, and the minimum detectable concentration (MDC). Uncertainties must be reported for all radiochemistry based on the total propagated uncertainty and calculations shall be checked for each method and laboratory. If the sample results are less than the uncertainty or between the uncertainty and MDC, then the sample result is indistinguishable from background and reported as “UJ” at the MDC. Sample results also will be compared to the blank results based on comparison to uncertainty of the results.

The Tier 3 QA elements for the CCS Tracer Suite isotope analysis include:

- Holding times;
- Mass spectrometer tuning and calibration;
- MDLs and units;
- Isobaric correction factors;
- Standard traceability;
- Post-analysis calculations/standardization; and
- Preparation/analysis batch information;

Associated sample data will be qualified as estimated (“J”) if:



- Holding times were not met;
- MS tunes and calibration fail one lab acceptance criteria;
- MDLs are reported above project stated MDLs;
- Correction factor/standardization calculations cannot be verified by manual recalculation;
- Standards and reference material certifications are not provided; and
- Batches exceed those described in Section 3 and Appendix B.

The data reviewer shall use professional judgment when rejecting data. If any of the QC elements above are significantly or entirely neglected, all associated QC will be reviewed to assess the need for possible rejection of data. The reasoning shall be documented in detail in the DVR for any rejected data. When the nature of the rejection is determined, the laboratory shall be notified of the rejection and shall take the appropriate steps necessary to ensure acceptable data re-delivered in the future.

A summary of the specific QC elements and related standards used in the respective analyses are described below.

#### **$^2\text{H}/^1\text{H}$ and $^{18}\text{O}/^{16}\text{O}$**

For hydrogen and oxygen isotopes, all data are calibrated using VSMOW and are reported in parts per thousand (‰) according to the conventional notation.

In the analysis, the ratios of the beams detected at the reference masses are directly proportional to the ratios in the sample or reference gas through isobaric correction factors (see Appendix B). In order to correct the ratio, several correction factors are necessary to eliminate the contribution of  $\text{C}^{13}\text{O}^{17}\text{O}^{16}$  and  $\text{C}^{12}\text{O}^{17}\text{O}^{17}$  (Craig, 1957). The hydrogen ratio is corrected by contributions from  $\text{H}_2$  to HD. In addition, corrections are necessary to convert values of oxygen and hydrogen isotopes measured relative to VSMOW to the VSMOW-GISP-SLAP scale.

#### **$^{13}\text{C}/^{12}\text{C}$**

For carbon isotopes, all data are calibrated relative to VPDB. The ratio of the integrated areas of the mass beams is computed relative to a reference gas of known isotopic composition which is injected into the mass spectrometer after the sample peak as been processed. Standardization is achieved by analyzing a  $\text{NaHCO}_3$  solution in the same manner.

#### **$^3\text{H}$**

Tritium analysis will be by liquid scintillation with some samples undergoing electrolytic enrichment to achieve the project required MDLs.

At least two known tritium standards will be analyzed per batch (14 samples + 2 standards). Two waters with known tritium concentration will be produced by diluting water from the NIST standard to about 50 tritium units (TU) with water known to be tritium-free. In addition, a blank sample consisting of tritium-free water will be analyzed for background correction of the counter.



**$^{87}\text{Sr}/^{86}\text{Sr}$** 

Strontium analysis will be performed by TIMS. No fewer than 70 ratios are measured to achieve a target intensity of  $^{88}\text{Sr} = 3 \text{ V}$ . This provides a standard error for the mean of exponentially corrected  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio of 0.001%. This corresponds to approximately 30 parts per million (ppm) with  $2\sigma$  uncertainty.

Data are corrected for  $^{87}\text{Rb}$  interference based on measured  $^{85}\text{Rb}$  abundance. Also, a correction factor of 0.1194 is applied to  $^{86}\text{Sr}/^{88}\text{Sr}$  to account for fractionation. Data are reported with respect to a value of 0.710250 for NBS-987. No bias correction is made to the analytical data.

The method does not measure concentration, so Limit of Detection (LOD) is not applicable. Isotope ratio measurements can be successfully achieved in water samples containing Sr concentrations as low as 0.1 ppb.

**Data Review of Other Analyses**

The review of data generated by these analyses will be based on the standard method requirements, DEP-EA-001/07, and established laboratory precision and accuracy control limits:

- Alkalinity;
- Ammonia;
- Ammonium;
- Nitrate+Nitrite;
- Total Kjeldahl Nitrogen;
- Total Nitrogen;
- Total Phosphorus;
- Soluble Reactive Phosphorus;
- Silicate;
- Sulfides;
- Total Dissolved Solids;
- Dissolved Inorganic Carbon; and
- Gross Alpha.

These analyses will be reviewed for:

- Verification that field COC forms were completed and that the samples were handled properly;
- Verification that holding times were met for each parameter. Holding time exceedances will be documented. Data for all samples exceeding holding time

requirements will be flagged as having exceeded the holding time. Qualifier codes are listed in Table 4.1-;

- Verification that parameters were analyzed according to methods specified;
- Technical consistency comparisons (i.e., charge balance, major ions and TDS versus conductivity, analyzed versus calculated TDS);
- Review of QA/QC data (assurance that duplicates, co-locates, blanks, and spikes were analyzed on the required number of samples as specified in the method and/or this QAPP; verification that duplicate and MS recoveries, if applicable, were acceptable); and
- Data may be qualified as unusable during the data validation process. All results rejected based on not meeting data quality indicators in the QAPP will be reported to the laboratory for evaluation and corrective action. The data set as a whole will be considered if overall completeness objectives are met and critical data points are not impacted.

In some cases, data may be considered unusable based on the reported result compared to known standards. Any questionable results will be verified based on laboratory raw data. For chemistry results, the sum of the individuals for most routine measurements should not be more than 120% of the total measurement based on FDEP-QA-002/02. Examples relative to this program include but are not limited to:

- Total phosphorus  $\geq$  Total dissolved phosphorus  $>$  Soluble reactive phosphorous;
- Total Kjeldahl nitrogen  $\geq$  Total dissolved Kjeldahl nitrogen  $>$  Ammonia; and
- Nitrate + Nitrite  $\geq$  Nitrite.

#### 4.2.3.2 Data Usability Summary (DUS)

The person reviewing and validating the data will prepare a DUS that describes the results of the data validation effort and summarizes the usability of the data in meeting specific project objectives. The DUS will discuss what QC measures were reviewed and validated, how these measures were reviewed or validated, the evaluation criteria used in the review/validation, all items identified as falling outside the evaluation criteria, the specific data potentially affected, and the potential effect on the quality of the associated data. A brief summary of the contents required for each section of the DUS is provided below.

The DUS will include the following sections:

- Introduction;
- Analytical Results;
- Summary; and
- Appendix.

The Introduction of the DUS provides a description of the data that were validated and identifies the project for which the validation was performed and the contents of the DUS. This section will include the validation guidance document used, project specific QC objectives, and when the analytical reports were received from the laboratory.

The Analytical Results section will include a table cross-referencing the laboratory identification number to field identification numbers and will identify all field QC samples submitted blind to the laboratory. The “QC” column will include all associated QC performed on a particular specification of samples associated with the given QC sample. The “ID Corr” column will describe any sample identification corrections made.

This section will also include the results of the data validation, as applicable to the project. The section will indicate all items identified as falling outside the evaluation criteria, the specific data potentially affected, and the potential effect on the quality of these associated data. All professional judgment used in making decisions concerning qualification of data associated with QC measures outside acceptance criteria will be included. It is acceptable for this section to contain descriptions only of those QC measures failing to meet acceptance criteria, as long as the text specifically indicates that all other QC measures specified for review met acceptance criteria for data review.

The Analytical Results section of the DUS will also contain a description of the reason for qualification and the direction of potential bias or imprecision (if known). Data review procedures will involve assignment of bias codes to each result qualified or rejected during data review. These bias codes will reflect the reason for qualification as well as the potential direction of bias. Qualifiers and bias codes to be used are listed in Table 4.2-5.

The Analytical Results section will include a discussion of the following QC items:

- Preservation and holding time issues;
- Calibration issues;
- MDL/RL/CRQL issues;
- Blank contamination;
- Interference check standards;
- LCS issues;
- Matrix spike issues;
- ICS, SD, and PDS issues;
- Lab duplicate precision;
- Field duplicate precision;
- Table of field duplicate results; and
- Table of qualified data.

The DUS will describe the effect of the uncertainty associated with results qualified as estimated which may affect the usability of the data in making a meaningful comparison to the project objectives. The text will include an evaluation of how representative the analytical results are of the medium being evaluated based on measures such as sampling design, replicate analyses, etc. It will include discussion on the sufficiency of the valid data set in meeting project objectives. The DUS will also contain a listing of all data that have been rejected during data review or that have been considered to be unusable in meeting specific project objectives. It will also provide a detailed discussion of whether any of the rejected or unusable data are considered critical to meeting project objectives and what the specific project consequences are of having these rejected or unusable data.

The complete results, including data qualifiers, will be summarized in a crosstab table. The results will be compared to applicable surface water, groundwater, and drinking water standards listed in Table 3.2-1. Surface water criteria is subdivided into fresh water and marine water. The classification of surface water between fresh and marine water is based on the chloride concentration. When chloride levels in a sample are <1500 mg/L, they are considered fresh; ≥1500 mg/L is considered marine. Specific conductivity will be noted on the COC's to assist the laboratory in selecting the appropriate methods of preparation and analysis. However, for data review and assessment, the chloride concentration will be used to determine the specific matrix.

The laboratory data packages, ADaPT files, isotope result tables, and complete result tables will be posted to the website along with the DUS upon completion. The test reports annotated with the final data review qualifiers and associated bias codes will also be included. Each reviewed test report will be initialed and dated by the person who performed the review. The appendices will also contain copies of the COC forms, if these are not included as part of the laboratory data package.

### **4.3 Data and Document Submittal**

Data collected will be uploaded to the secure website per the requirements in the Monitoring Plan. The Electronic Data Management System (EDMS) is a secure, password-accessible site (<http://css-3-4-plan.com>) for FPL and Agency staff that is available 24-hours a day, 7 days a week (Figure 4.3-1).

#### **4.3.1 Electronic Data Management System (EDMS)**

The EDMS is a fully backed-up, secure online system that contains the data collected in this project. As this system is constantly being refined and improved to provide greater utility, only a general overview of the key processes is included here.

In order to gain access, visitors first provide their name, email address and the reason for requesting access. If the user is vetted by FPL, they will be emailed a temporary password to log in. The login page will require their Username (email address) and password each time (Figure 4.3-2).

Upon logging in, three tabs will be available for viewing of the data (Figure 4.3-3):

- Query Builder: where the Validated and Query-able data is available for viewing and download
- Data and Documents: where all the raw files and documents related to the automated and quarterly field and analytical data, ecological data, maps, and reports are stored
- Interceptor Ditch Operations: shows the daily calculations to indicate if pumping of the Interceptor Ditch should occur

The EDMS has been built with flexibility and ease of usability in selecting for the data of interest. Key details of each tab are discussed further in the following sections.

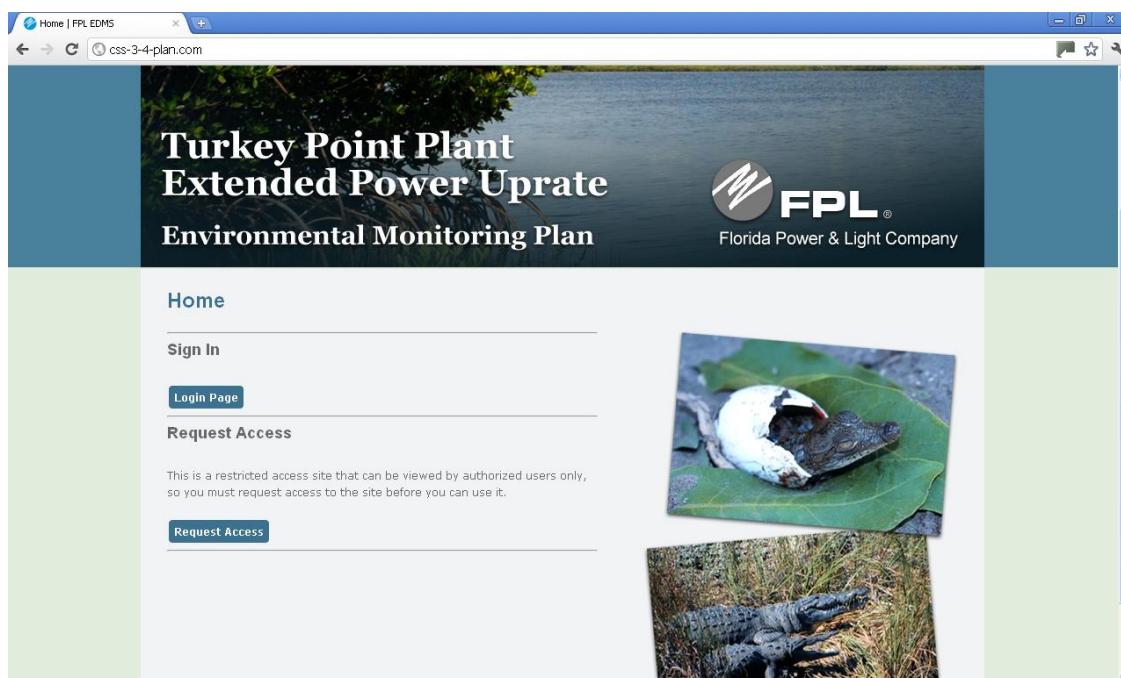


Figure 4.3-1. Screenshot of the homepage for the secure website.

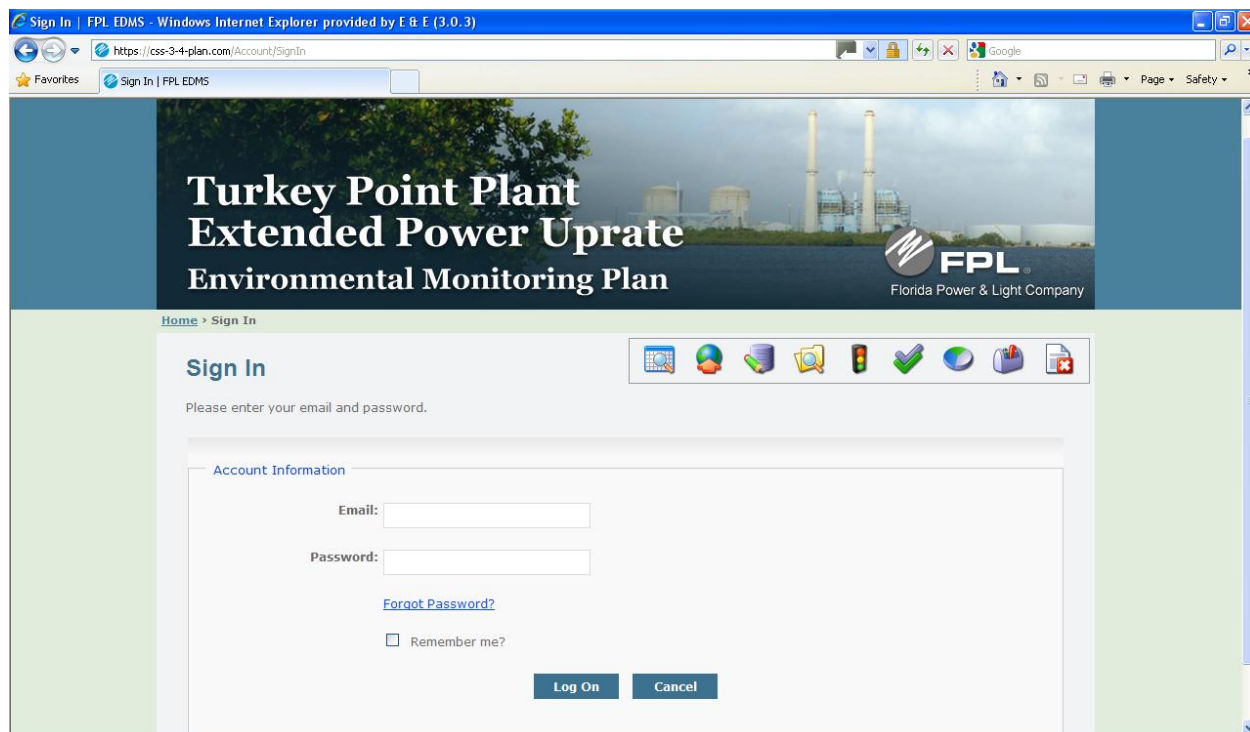


Figure 4.3-2. Log-in page for the EDMS website.

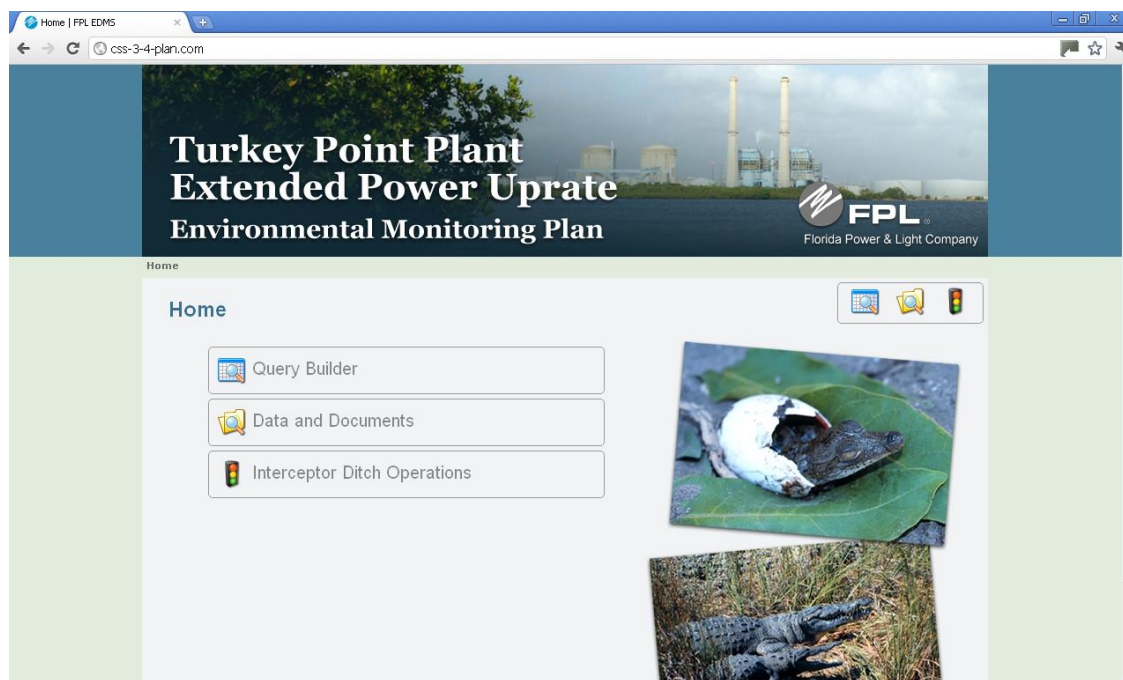


Figure 4.3-3. Screenshot of tabs used to extract data from the database.



#### 4.3.1.1 Query Builder

The Query Builder is a means for viewing and extracting automated data that has been qualified and validated (Figure 4.3-4). This data is only available after FPL has reviewed the information and ensured that the data are accurate. All raw automated data uploaded on a daily basis is still available for viewing via the Data and Documents tab.

Users landing on this page (Figure 4.3-4) have the ability to select the site (or sites) of interest either by clicking on the blue dots on the map or selecting the stations listed on the right. Each blue dot on the map represents a site—when the cursor is placed over the location, a call-out box automatically pops out and shows the site name. Clicking on the site name will result in the automatic selection of the site that then reflects as a green check (✓). For Users interested in conducting the same queries over time, the query of interest can be saved and in future, just pulled down from the “Load Saved Query” tab to save time.

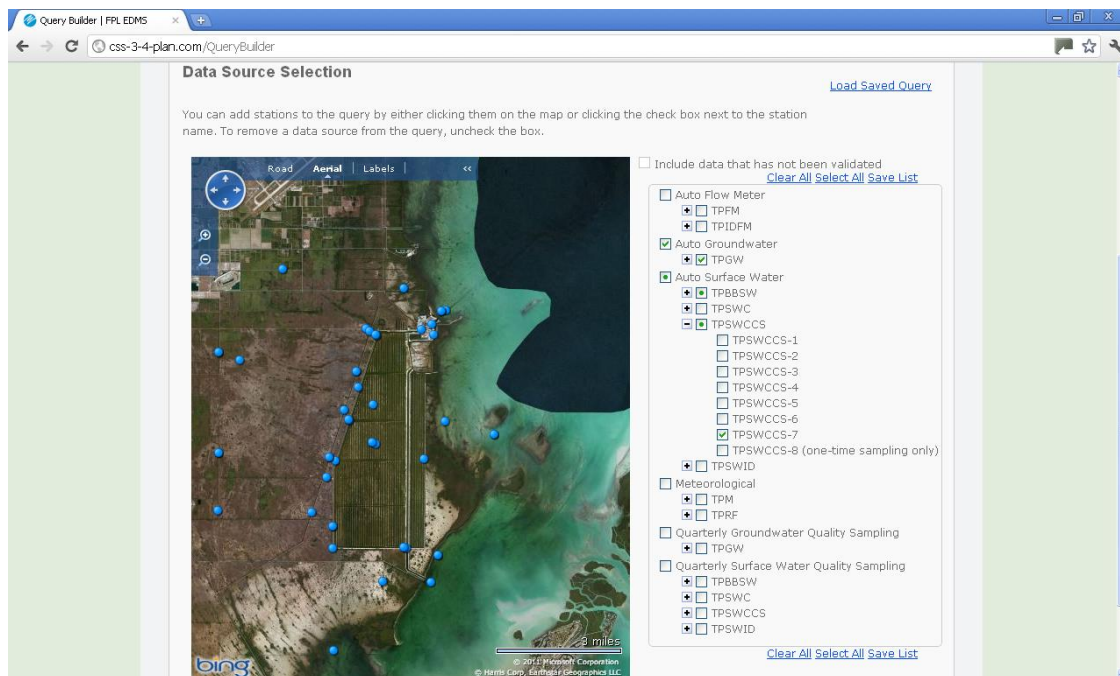
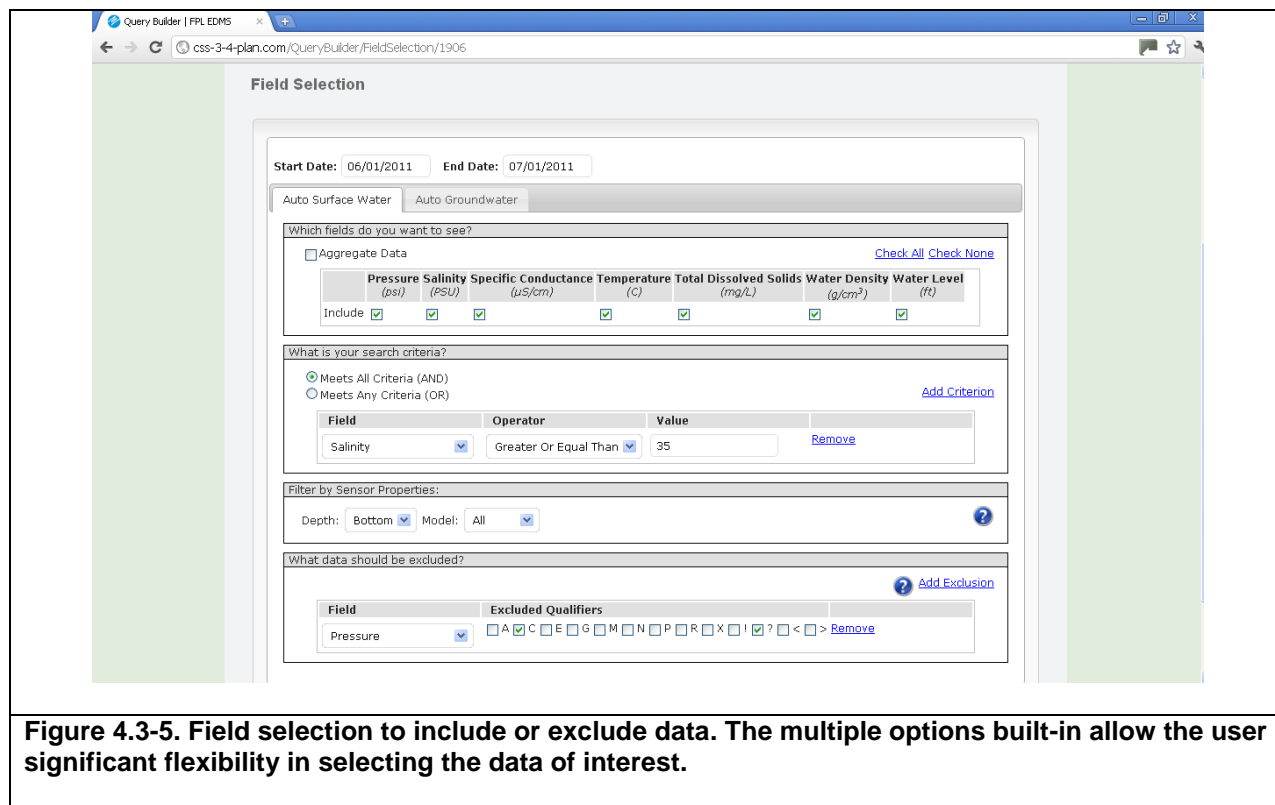


Figure 4.3-4. Screenshot of Query Builder page for site selection.

At the next page, a series of options are presented (Figure 4.3-5). By default, the data for the last month is selected; however, the User can click on the boxes containing the start and end dates and select the duration of interest. A series of boxes are presented on the same page to allow the User to further refine their search in a series of pull-down tabs. This page will allow the User to select either as many parameters desired. Users can also select various criteria for any of the parameters of interest, view data by sensor properties such as location or model of the probe, and by the type of data qualified.

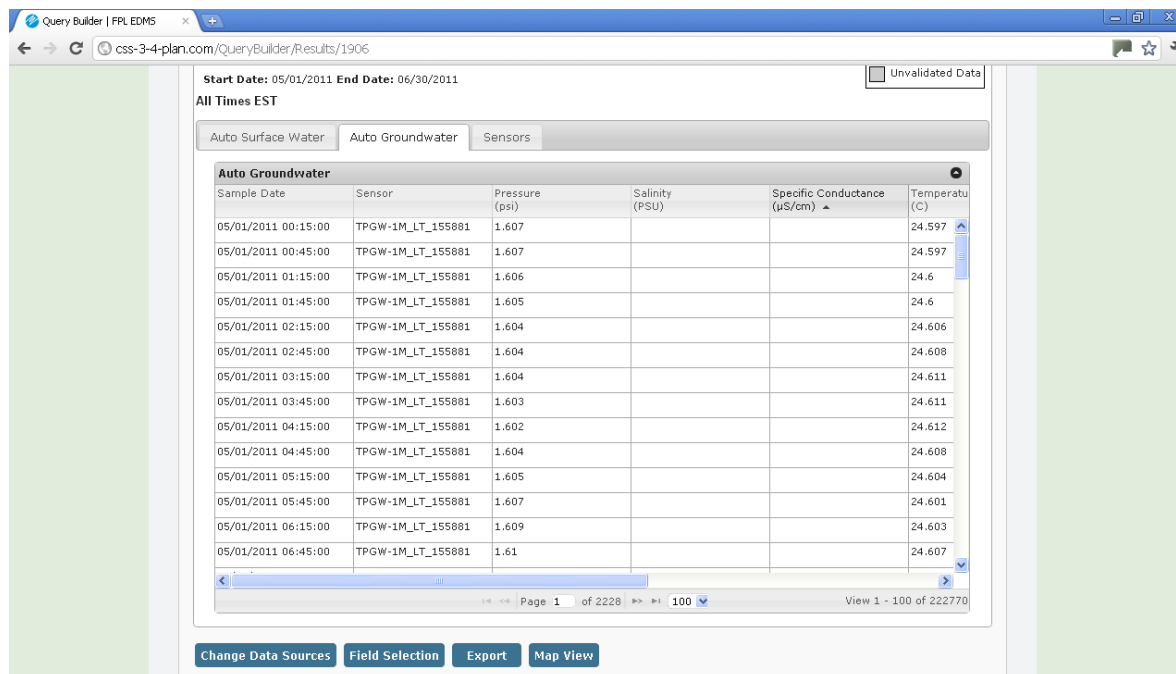




**Figure 4.3-5. Field selection to include or exclude data. The multiple options built-in allow the user significant flexibility in selecting the data of interest.**

The selected data are presented on different spreadsheets by probe type i.e. Surface Water or Groundwater, and can be sorted by clicking on each column header (Figure 4.3-6). Data can then be exported as a zipped up text file (.csv); the data files will be accompanied by a text file detailing the changes to the data from the Validation process. Data can also be viewed in the map-view GIS layer but it is recommended that smaller amounts of data ( $\leq 1$  month) be viewed as it is more process-intensive.

The GIS layer is supported by Microsoft Silverlight and comes pre-set with a series of tool kits (seen as icons below) such as measuring distances between sites, viewing the data as a histogram or time-series, and getting basic descriptive statistics (average, minimum, maximum) from the data (Figure 4.3-7). All graphs and data generated from the GIS layer can be exported as well.



Query Builder | FPL EDMS  
css-3-4-plan.com/QueryBuilder/Results/1906

Start Date: 05/01/2011 End Date: 06/30/2011  
All Times EST

Auto Surface Water Auto Groundwater Sensors

**Auto Groundwater**

Sample Date	Sensor	Pressure (psi)	Salinity (PSU)	Specific Conductance (µS/cm)	Temperature (C)
05/01/2011 00:15:00	TPGW-1M_LT_155881	1.607			24.597
05/01/2011 00:45:00	TPGW-1M_LT_155881	1.607			24.597
05/01/2011 01:15:00	TPGW-1M_LT_155881	1.606			24.6
05/01/2011 01:45:00	TPGW-1M_LT_155881	1.605			24.6
05/01/2011 02:15:00	TPGW-1M_LT_155881	1.604			24.606
05/01/2011 02:45:00	TPGW-1M_LT_155881	1.604			24.608
05/01/2011 03:15:00	TPGW-1M_LT_155881	1.604			24.611
05/01/2011 03:45:00	TPGW-1M_LT_155881	1.603			24.611
05/01/2011 04:15:00	TPGW-1M_LT_155881	1.602			24.612
05/01/2011 04:45:00	TPGW-1M_LT_155881	1.604			24.608
05/01/2011 05:15:00	TPGW-1M_LT_155881	1.605			24.604
05/01/2011 05:45:00	TPGW-1M_LT_155881	1.607			24.601
05/01/2011 06:15:00	TPGW-1M_LT_155881	1.609			24.603
05/01/2011 06:45:00	TPGW-1M_LT_155881	1.61			24.607

Page 1 of 2228 100 View 1 - 100 of 222770

Change Data Sources Field Selection Export Map View

Figure 4.3-6. Results from data selection process. Surface and Groundwater data are shown in separate sheets. Data can be exported as a zipped text (.csv) file or viewed in a GIS map layer.

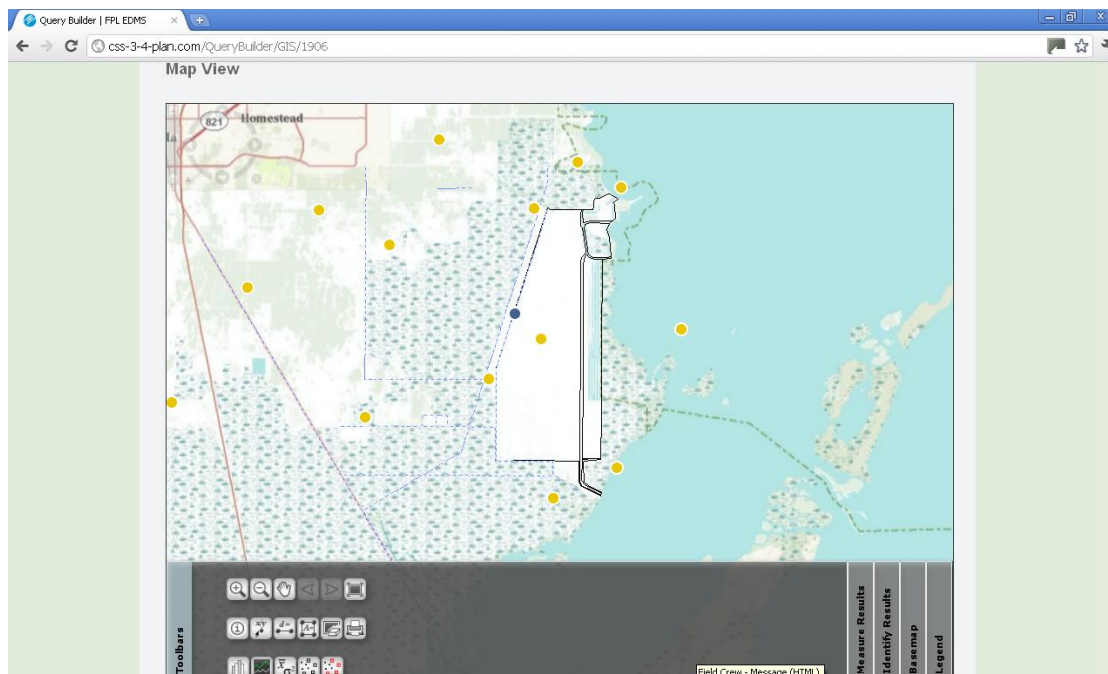


Figure 4.3-7. GIS map view of the data. The toolbar has a toolkit of features that allow the User to measure distances, view the data at different sites as time-series or histograms.

## 4.3.1.2 Data and Documents

The Data and Documents section (Figure 4.3-8) of the EDMS includes but is not limited to:

- all raw automated files downloaded daily from each station or probe via telemetry;
- probe maintenance and cleaning/calibration sheets;
- ecological field books and data;
- Quarterly analytical data sampling field logs, sampling sheets, and equipment calibration logs;
- Level IV analytical laboratory results for NELAC-certified parameters, as well as the results in MSEXcel and ADaPT formats;
- MSEXcel sheets for non NELAC-certified parameters (e.g. carbon, oxygen, hydrogen and strontium stable isotopes, tritium analysis)
- pictures, maps, schedules, reports;

**Data and Documents**

Note: All telemetry files available on this page contain raw data only. Water level values have not been corrected against reference pressures or levels. Analysis ready data is available from the Query Builder

Keyword:  Search

Category:  All

Format:  All

Subcategory:  All

Upload From:  04/26/2011

Sample Site:  All

To:  07/26/2011

Sensor:  All

Model:  All

Title	File Name	Uploaded	Hierarchy	Description
<a href="#">South station_DiagnosticData.dat</a>	South station_DiagnosticData.dat	07/26/2011	• Auto Flow Meter • TPFM • TPFM-2 • TPFM-2S_CR_000008	Automated upload of YSI data
<a href="#">Outflow station_DiagnosticData.dat</a>	Outflow station_DiagnosticData.dat	07/26/2011	• Auto Flow Meter • TPFM • TPFM-1 • TPFM-1S_CR_000007	Automated upload of YSI data
<a href="#">Met Station_Station15MinData_2011</a>	Met Station_Station15MinData_2011	07/26/2011	• Meteorological • TPM • TPM-1 • TPM-1S_CR_000006	Automated upload of YSI data
<a href="#">Met Station_Station15MinData_2011</a>	Met Station_Station15MinData_2011	07/26/2011	• Meteorological • TPM • TPM-1	Automated upload of YSI data

**Figure 4.3-8. Example of the Data and Documents page with the options to select data of interest based on a series of options.**

Users can select data based on a number of options that include keywords, categories (e.g. surface water, groundwater, meteorological, etc.), upload date and file format (Figure 4.3-8). The selections will be reflected in the table below and the User can click on the blue arrow (↕) to download the file of interest or select the whole list of files for export.

#### 4.3.1.3 Interceptor Ditch (ID) Operations

The Interceptor Ditch (ID) Operations page uses data from nine stations, three along each transect (Table 4.3-1) to calculate differences in water level between the L-31E canal and the CCS, and the L-31E with the ID to determine if pumps in the ID need to be turned on (Figure 4.3-9).

The calculation is done on a daily basis integrating the previous calendar day's 24-hours (of 15-minute interval data) and generated early (~ 4 a.m.) the following day. A week's worth of calculation is automatically displayed although the User has the option to select a longer period. As calculations are being conducted on the raw unvalidated data and may be subject to change.

**Table 4.3-1. Calculations applied to generate the data for the Interceptor Ditch Operations.**

Transect	Stations		
	L-31E	ID	CCS (Canal-32)
A	TPSWC-1	TPSWID-1	TPSWCCS-1
C	TPSWC-2	TPSWID-2	TPSWCCS-7
E	TPSWC-3	TPSWID-3	TPSWCCS-3

Transect	Date	L-31 (Avg. ft)	ID (Avg. ft)	C-32 (Avg. ft)	L31-C32 (ft)	L31-ID (ft)	Should Pump Be On
A	07/01/2011	0.070	-0.390	-0.020	0.100	0.470	No
C	07/01/2011	0.100	-0.390	-0.040	0.150	0.500	No
E	07/01/2011	0.100	-0.420	-0.590	0.700	0.530	No
A	06/30/2011	0.060	-0.460	-0.010	0.070	0.530	No
C	06/30/2011	0.090	-0.460	-0.030	0.130	0.560	No
E	06/30/2011	0.100	-0.510	-0.590	0.690	0.610	No
A	06/29/2011	-0.230	-0.630	-0.010	-0.220	0.390	No
C	06/29/2011	-0.170	-0.640	-0.040	-0.120	0.460	No
E	06/29/2011	-0.140	-0.660	-0.610	0.460	0.510	No
A	06/28/2011	-0.330	-0.780	0.020	-0.350	0.450	No
C	06/28/2011	-0.350	-0.790	0.010	-0.370	0.430	No
E	06/28/2011	-0.330	-0.800	-0.610	0.280	0.460	No
A	06/27/2011	-0.320	-0.700	0.040	-0.360	0.380	No
C	06/27/2011	-0.330	-0.700	0.010	-0.350	0.360	No
E	06/27/2011	-0.310	-0.690	-0.620	0.310	0.370	No

**Figure 4.3-9. Data from the different stations (Table 4.3-1) used to determine if the ID pumps should be turned on.**

#### 4.3.1.4 Reporting format and schedule

Electronic copies of all reports generated directly from this Monitoring Plan implementation will be provided to the SFWMD Director of Water Supply Management, Miami-Dade County Director of DERM, FDEP Director of the Southeast District Office, FDEP Siting Coordination Office Director, and Biscayne Bay Aquatic Preserve Manager.

The information provided will be adequate to enable the agencies to understand potential physical, chemical, and ecological impacts of water movement and/or interchanges between the CCS, surface water, and groundwater. The required data and reports to be generated for the project are discussed in the Monitoring Plan and are summarized in Table 4.3-2 below.

#### 4.3-2. Report Submittal Summary

Type of Reporting	Submittal to the Agencies	Comments
Automated Data	Electronically posted to a secure web site generally on a daily basis except for non telemetry stations which will have data uploaded approximately every six to eight weeks.	Data not official until FPL conducts a QA/QC review. Data Assessed in semiannual and annual reports.
Manual Data	Electronically posted within 3 months after sampling event or at minimum provide a status as to when the data will be posted	Data Assessed in semiannual and annual reports.
Analytical Data	DUS and analytical documentation electronically posted within 3 months after sampling event was completed and receipt of all lab data.	Raw data submitted to Agencies by FPL within 48 hrs of receipt from the laboratory. Data not official until FPL conducts a QA/QC review (i.e. DUS).
Surveyor's Report	Electronic and hard copies submitted to agencies within 60 days following completion of the station survey	Schedule not specified in Monitoring Plan
Borehole Geophysics Logs	Electronic drafts provided within several days after each borehole logging. Final logs electronically posted within 60 days following completion of each well cluster.	
Borehole Geophysics Summary Report	Electronically posted within 60 days of the completion of all wells	
Geology and Hydrogeology Report	Electronically posted within 30 days after receipt of first round of validated groundwater well analytical results	Schedule not specified in Monitoring Plan
Biscayne Bay Geophysical Survey	Electronically posted within 6 months of completion of survey	
Initial Ecological Condition Characterization Report	Electronically posted within 1 year of plan approval or as directed by the agencies	

**4.3-2. Report Submittal Summary**

Type of Reporting	Submittal to the Agencies	Comments
Semiannual Report	Electronically posted within 90 days of completion of Monitoring Season or 6-month monitoring period based on Agency concurrence	Wet season (June through November) and dry season (December through May)
Annual Report (including water budget)	Electronically posted within 90 days of completion of sampling and analysis for each year	Takes place of every other semiannual report
Comprehensive Pre-Uprate Report	Electronically posted within 90 days of completion of sampling and analysis for each year	Will take the place of one of the annual pre-uprate reports

Additional deliverables may be required as this project proceeds. In all instances a clear understanding of the deliverable requirements and due dates will be established. Due dates may be modified if agreed to by FPL and the SFWMD.

**4.4 Data Storage and Custody**

Data management of field logbooks, calibration logs, data sheets, automated electronic data, laboratory data, and project reports will be maintained and managed following FDEP SOP FD1000 Documentation procedures. Data collected from manual sampling and monitoring will be stored in a database by FPL allowing the agencies access to the data. The database will be maintained and archived by FPL on a web portal. A web master's contact information will be clearly posted on the web page.

SQL Server, version 2008 or later, will be used as the database manager and SQL Server Management Studio will be used to access the database directly. Agency access to the database will be through the password protected web site. To keep the database system up-to-date, all relevant security patches that Microsoft releases for SQL Server as well as the operating system SQL Server is running on will be applied.

All electronic data results, including laboratory data results, will be maintained in their original form in the database. Data changes such as unit adjustments, changes in reporting limits based on data validation, and rejection of data will be maintained in separate fields or records with specific meta data acknowledging how and why data were modified and specific party authorizing the data change. Data custody, security, access, and archiving procedures and requirements are discussed below. Further details on the data management, format, structure, and access have been provided to the agencies in team meetings.

**4.4.1 Custody**

Custody procedures must be established to protect data and information integrity. Custody of data shall be documented from creation to its final storage place. Once data is finalized, validated, and transferred to the database, further changes may only be made upon approval from the FPL PM (or their designee). Once the data are stored in the database, data custody will be the responsibility of FPL. Contractors will not release data to third parties



without written permission from FPL. On a yearly basis, the PM will oversee audits to document compliance with custody requirements.

#### **4.4.2 Security**

All data and all records will be protected against fire, theft, loss, and environmental deterioration. Electronic data and electronic records will also be protected from electronic or magnetic sources. Storage media will be protected from deteriorating conditions such as temperature, humidity, magnetic fields, or other environmental hazards. An electronic data backup procedure to recover from disaster or hardware failures must be identified. Tape backup systems or equivalent should be tested annually (at a minimum) by restoring information from back-up to online resources.

Data migrations and changes in information technology infrastructure must be documented. It is critical that new operating systems, electronic data filing systems, databases, and data handling systems are capable of supporting existing data for the required retention period, or provide an adequate path of migration for it.

#### **4.4.3 Access**

Data and records, whether paper or electronic, will be available according to the schedule outlined in Table 4.3-1 above and in the Monitoring Plan. Access to electronic copies of all data and reports generated directly from the Monitoring Plan activities will be provided to the agencies, as described in Section 4.3.1. The agencies will be given passwords to access the data 24 hours a day/7 days a week. Access to data within organizations should be handled as per their specific protocol, but at a minimum will include password-protected access and a secure location for the generated data.

To ensure data validity and integrity, a mechanism must be in place to give access solely to authorized individuals. This may be accomplished by using usernames and passwords, entry cards, or other suitable mechanism to provide privileges according to roles and responsibilities of data creators, users and system administrators. PMs are responsible for ensuring the data flow is complete and correct.

#### **4.4.4 Archiving**

The database server will be backed up nightly to minimize the risk of data loss; data that is backed up will be stored off-site in order to provide further physical protection.

All records in the FPL project database, file system, or Document Management System, as well as CDs and tape back-ups, must be retained indefinitely. Per the DEP QA Rule, 62-160.220 & .340, F.A.C. and FDEP SOP FD1000 Documentation, all raw data records, including laboratory and sample collection documentation, will be kept for a minimum of five years beyond the end of the project. FPL will obtain written consent from the SFWMD before disposing of records at the end of the five-year period. All information necessary for the historical reconstruction of data including original observations, calculations, calibrations, and reports, must be maintained by the data collection organization for at least five years beyond the end of the project. Five years after the end of the project, records can be destroyed unless records are to be used for evidentiary or legal purposes. Records that are stored only on electronic media must be supported by the hardware for their retrieval.

In the case of laboratory stored data, the record keeping system must ensure that all records are maintained or transferred per the client's instructions in the event that a laboratory transfers ownership or goes out of business. The laboratory will obtain written consent from FPL before disposing of records.