# 4 Data Management and Reporting

Data Management and Reporting



## 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

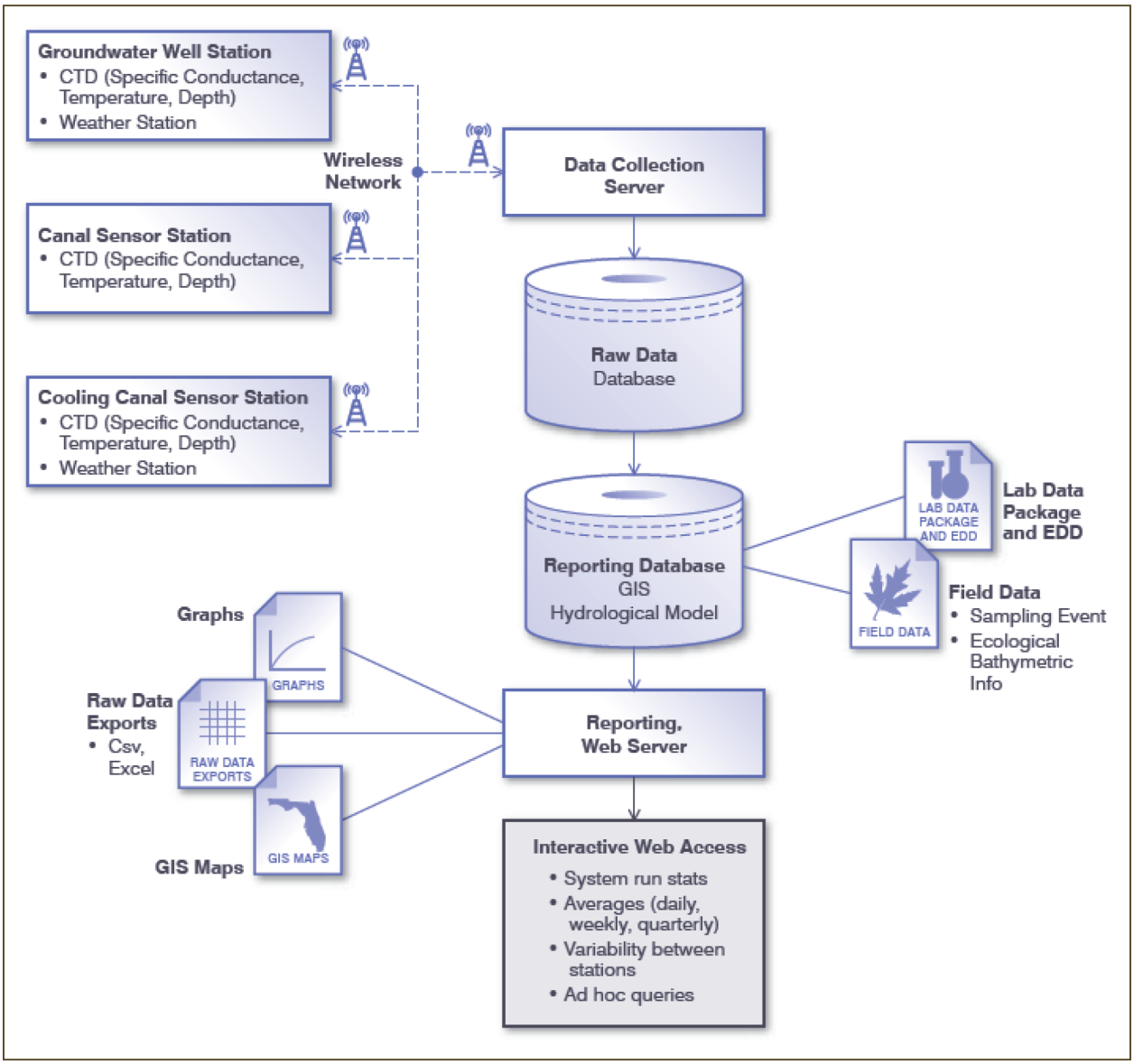


**Figure 4.1-1. Data Flow Chart**

### 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. |

#### 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. During Pre-uprate monitoring, data from each automated station was collected at 15-minute intervals from the top of each hour. The frequency of data collection is reduced to hourly during the post-uprate monitoring period. Data is 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. During the pre-uprate monitoring period, data from the current meters was collected at 15-minute intervals and electronically uploaded daily whenever possible. The requirement for Acoustical Doppler current meters was dropped from the 2013 post-uprate Monitoring Plan as these data were not needed under the approved water/salt budget methodology.

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. |
| E | Estimated | Designated estimated data. "**E**" 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. |
| ! | "Normal" limits exceeded | Indicate instances when normal data values have been exceeded. |
| ? | 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. Note: It is advised not to use this data except if there is a solid reason to do so. |

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

| Tags | Tag Description | Definition |
|---|---|---|
| <, > | 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 4.1.3.1.and the laboratory data review requirements are in Section 4.1.3.2, 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).

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. The case narrative will include a discussion of any issue affecting sample integrity upon receipt of the samples at the laboratory. This shall include (but is not limited to) sample volumes not consistent with the volume markings on bottles (see 2.6.6.1), samples not at required temperature and/or samples not properly preserved. 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/PQL 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, the data will be provided in two electronic forms; an MS Excel spreadsheet and an ADaPT file. The Excel file shall use the format generated by the lab and shall include all analytes, analyses, and analytical results. All results shall be reported to three digits but only two may be significant. The ADaPT EDD shall include 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 record all temperatures measured for each cooler. The laboratory shall also record any inconsistencies with sample volumes as received compared to sample volumes marked in the field (Section 2.6.6.1). 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 PQL 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 PQL 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. A non-project sample should only be used for the MS/MSD analysis in the case where the client does not send sufficient volume for analysis. When either, or both, MS/MSD recover and precision are out of control, the case narrative will address all instances the results failed to meet acceptance criteria. All recoveries are listed within the recovery pages of the report.

**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 Practical Quantitation Limits (PQL)**

The laboratory data package shall include the MDL and PQL 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 PQL 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:<br>1.The value is less than the lowest calibration standard and the calibration curve is known to be non-linear; or<br>2.The value is known to be less than the reported value based on sample size, dilution or some other variable.<br>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) and 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:<br>1. The component has been tentatively identified based on mass spectral library search; or<br>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 ADaPT EDDs shall be reviewed by the ADaPT EDD Error Checker to ensure completeness and that no critical errors exist prior to submission. 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 an approximate 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 (E) or questionable (?) if the data is clearly off. 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 0.5ºC of each other, the probe data subsequent to the previous continuing calibration verification is deemed acceptable. If the difference is greater than 0.5ºC, the data will typically be qualified as estimated (E) or questionable (?) if the data is clearly outside normal ranges.

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 typically 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 automated data required under the monitoring plan to be uploaded to the FPL database shall undergo an electronic review consisting of a comparison to expected ranges based on historic data and seasonal considerations and refined as more data becomes available.

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. This guideline cannot always be met given the size of the network and other logistical factors, however efforts will be conducted to repair or replace errant equipment within 7 days in order to maintain a robust data set.

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 ± 5% RH, thus recorded RH values in excess of 105% provide good evidence that the sensor is out of calibration. **All RH values in excess of 100% should be set equal to 100% prior to use in the evapotranspiration (ET) computation process.** |
| 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 as frequently as monthly for drift and anomalies when sufficient data are available and summarized in semi-annual and annual reports. For data stations without functional telemetry, data will be reviewed after data is downloaded in the field.

#### 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 each cleaning and calibration event (~60 days) 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 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. A Tier 2 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. |
| M2 | Matrix Spike RPD |
| D | Lab Duplicate RPD |
| L1 | LCS Recovery |

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

| Qualifier | Definition |
|---|---|
| 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 QAPPestablished 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 if the criteria is not specified in the QAPP. 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 QAPP or the methods. When laboratory limits are established in lieu of specified QAPP criteria, they shall be used for data review and validation.

Laboratory QC limits for non-standard methods are established by the respective laboratories doing the analyses specified in Appendix B.

Table 4.2-3 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 4.2-3. Data Validation Qualifier Codes[1]**

| 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. |

**Table 4.2-3. Data Validation Qualifier Codes[1]**

| Code | Definition |
|---|---|
| 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 exceeded for any analyte, 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").

### Standard Reference Material (SRM):

A SRM will be analyzed by the contract laboratory on an annual basis for all parameters identified on Table 4.2-4. The results will be reported and discussed in the associated Data Usability Summary and incorporated in the subsequent semi-annual or annual report. The suggested standard reference material for cation and anion concentrations is IAPSO Seawater (Standard Seawater).

**Table 4.2-4. Summary of Parameters (Cations/Anions) and Associated Composition of Standard Seawater for Salinity of 35.000[a]**

| Parameter | Mass Fraction[b] g/kg | Mass Concentration mg/L |
|---|---|---|
| **Cations** | | |
| $Na^+$ | 10.78 | 11,039 |
| $Mg^{2+}$ | 1.28 | 1,311 |
| $Ca^{2+}$ | 0.412 | 422 |
| $K^+$ | 0.399 | 409 |
| $Sr^{2+}$ | 0.0079 | 8 |
| **Anions** | | |
| $Cl^-$ | 19.35 | 19,814 |

| Parameter | Mass Fraction[b] g/kg | Mass Concentration mg/L |
|---|---|---|
| $SO_4^{2-}$ | 2.71 | 2,775 |
| $HCO_3^-$ | 0.126 | 129 |
| $Br^-$ | 0.067 | 69 |

Notes:
a - Actual concentrations may vary depending on SRM used
b - Mass fraction was calculated using a measured density of 1.024 g/mL

**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. If analytes are detected in a preparation blank, the laboratory will follow the procedures outlined in Section 3.2. When applicable (at least one sample in the analytical batch is less than ten times the detected concentration in the blank) the lab will re-prepare and reanalyze the batch with the blank contamination. If the contamination persists, or if limited sample is available for re-preparation, or if no further steps are required in Section 3.2, the laboratory shall qualify all sample results less than 10 times the blank concentration with the "V" qualifier 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**

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. 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. All matrix spikes will be fortified with the analyte of interest at an appropriate level respective to expected sample concentration (0.5 to 25 times the target analyte concentration). Automatic laboratory reanalysis is required for all unacceptable matrix spikes (and spikes not in the specified spike to sample ratio) in accordance with the process defined in Section 24.6.3 of the contract laboratory QA Manual and as specified in Standard Methods. 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+").
- If the MS recovery for an analyte is less than the lower acceptance limit but >10%, 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 <10%, 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.

All samples of a similar matrix (e.g., freshwater versus saline matrix ) in the analytical batch will be qualified with a 'J' if both the MS and MSD do not meet acceptance criteria.

**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 ≤20% for aqueous matrices and ≤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 ($^{3}H$, $^{2}H/^{1}H$, $^{18}O/^{16}O$, $^{13}C/^{12}C$, and $^{87}Sr/^{86}Sr$) 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 QA elements to be reviewed for the CCS Tracer Suite isotope analysis include:

- Holding times and preservation;
- MDLs ($^{3}H$, $^{87}Sr/^{86}SR$);
- Uncertainty ($^{3}H$);
- Standard deviation ($^{2}H/^{1}H$, $^{18}O/^{16}O$, $^{13}C/^{12}C$);
- Standard traceability;
- Preparation/analysis batch information;
- Field and laboratory duplicate RPD; and

- Field blank contamination.

The evaluation of holding times, preservations, MDL's, and field and laboratory duplicates shall follow the procedures outlined above. Holding time and preservation requirements for the isotope analyses are listed in Section 2.6. Required MDL's are listed in Section 3.2. Field and laboratory duplicate precision will be evaluated for all isotope results as described above.

Field blank results for hydrogen, oxygen, and carbon isotope data are not applicable as results are reported as unitless ratios. Field blank results for strontium and tritium blank results are evaluated as described above.

Laboratory QC limits for non-standard methods are established by the respective laboratories doing the analyses and are specified in Appendix B.

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

- Holding times were not met;
- MDLs are reported above project stated MDLs ($^{3}H$, $^{87}Sr/^{86}Sr$);
- Field blank contamination is greater than 10% of the sample concentrations ($^{3}H$, $^{87}Sr/^{86}Sr$ );
- Field duplicate RPD exceeds project objectives;
- Standards and reference material certifications are not provided; and
- Batches exceed those described in Section 3 and Appendix B.

In addition, for tritium, results with uncertainties greater than the results are reported as not detected and qualified with a "U".

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.

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

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 $C^{13}O^{17}O^{16}$ and $C^{12}O^{17}O^{17}$ (Craig, 1957). The hydrogen ratio is corrected by contributions from $H_2$ 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.

**$^{13}C/^{12}C$**

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 in achieved by analyzing a $NaHCO_3$ solution in the same manner.

**$^{3}H$**

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.

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

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

Data are corrected for $^{87}Rb$ interference based on measured $^{85}Rb$ abundance. Also, a correction factor of 0.1194 is applied to $^{86}Sr/^{88}Sr$ 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 ≥ Total dissolved phosphorus > Soluble reactive phosphorous; and
- Total Kjeldahl nitrogen ≥ Total dissolved Kjeldahl nitrogen > Ammonia
- .

#### 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 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/PQL/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 compared to applicable surface water, groundwater, and drinking water standards listed in Table 3.2-1. Surface water criteria are 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 conductance 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. The final version of each laboratory data package will be electronically signed on the front page before posting to the website. 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.

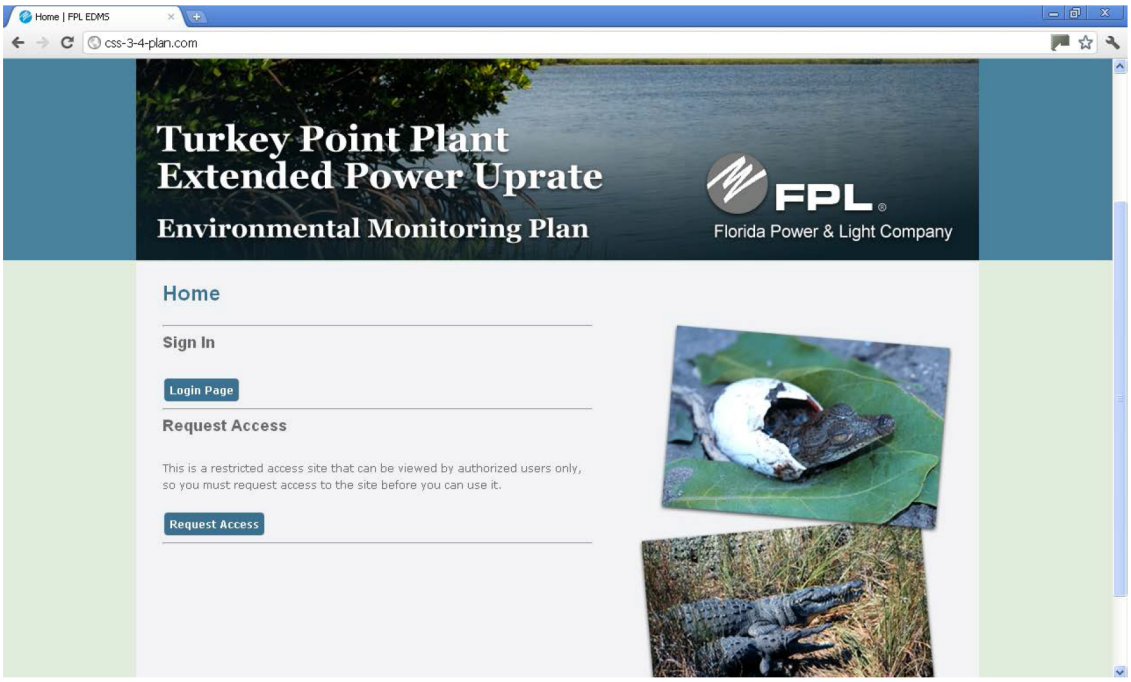


Figure 4.3-1. Screenshot of the homepage for the secure website.

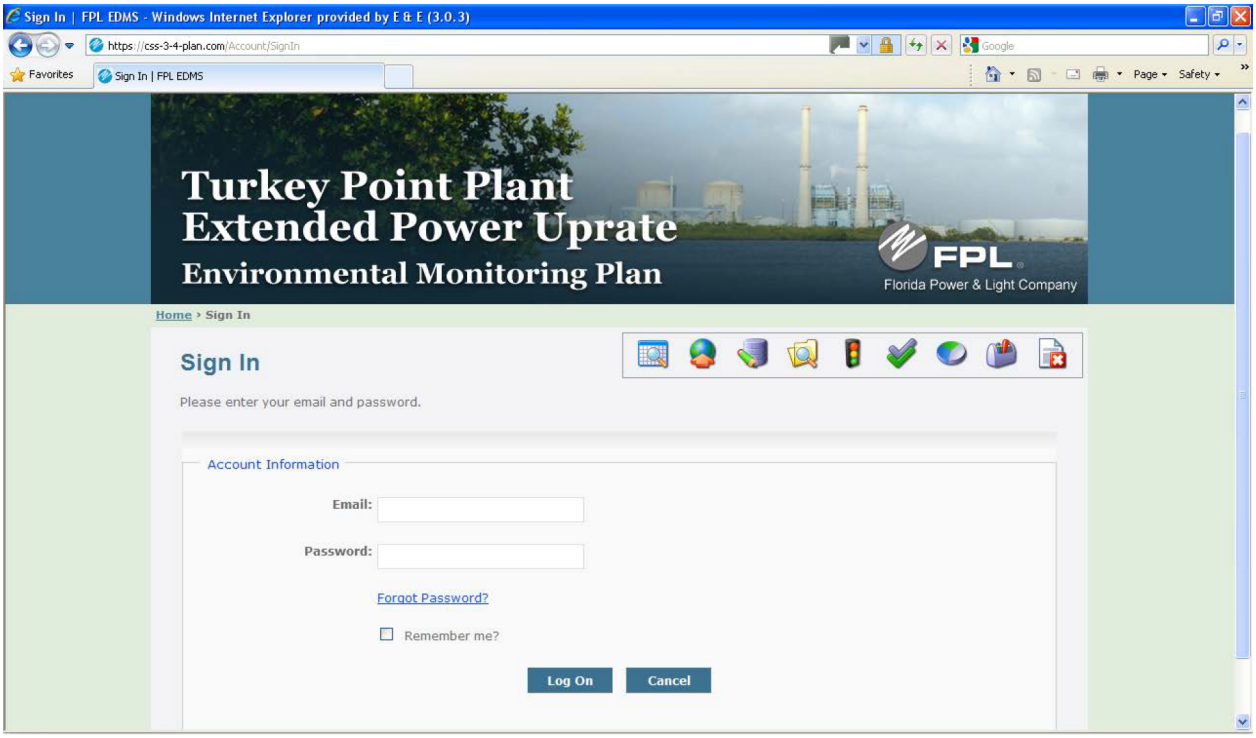


Figure 4.3-2. Log-in page for the EDMS website.

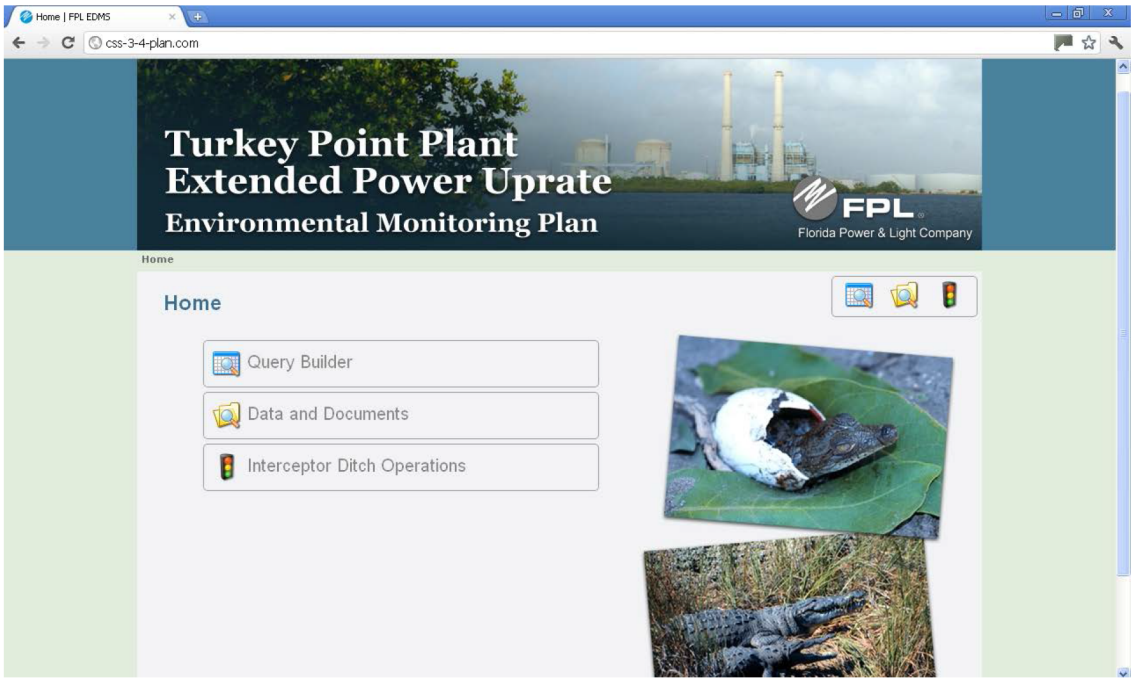


**Figure 4.3-3. Screenshot of tabs used to extract data from the database.**

#### 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.

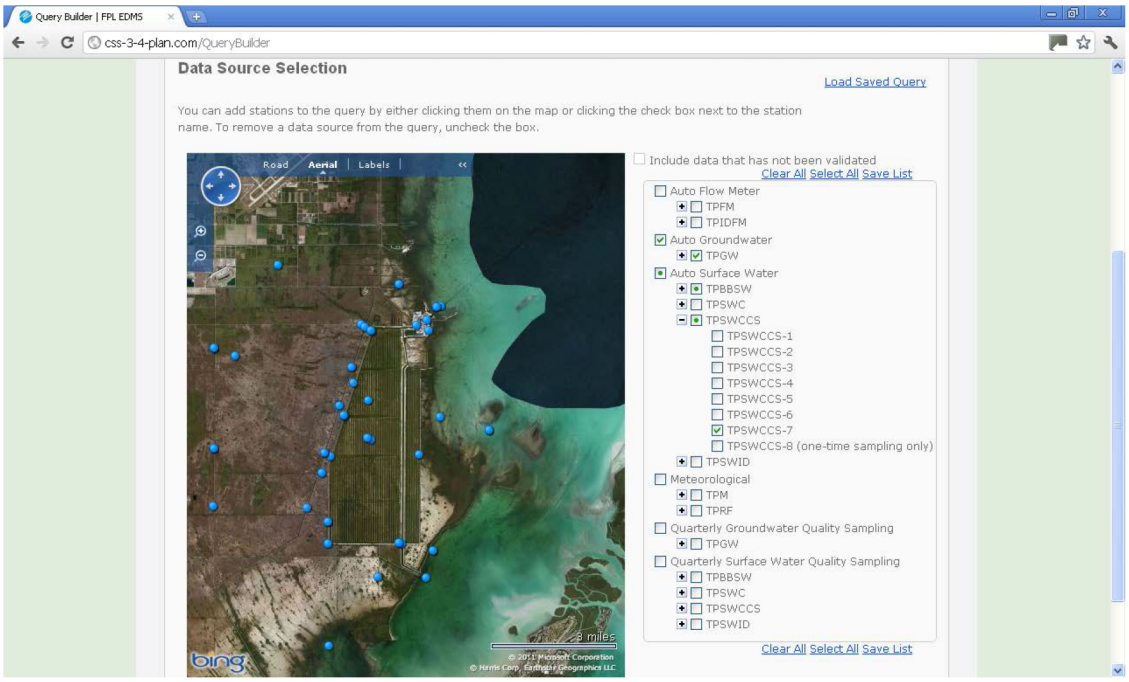


**Figure 4.3-4. Screenshot of Query Builder page for site selection.**

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.

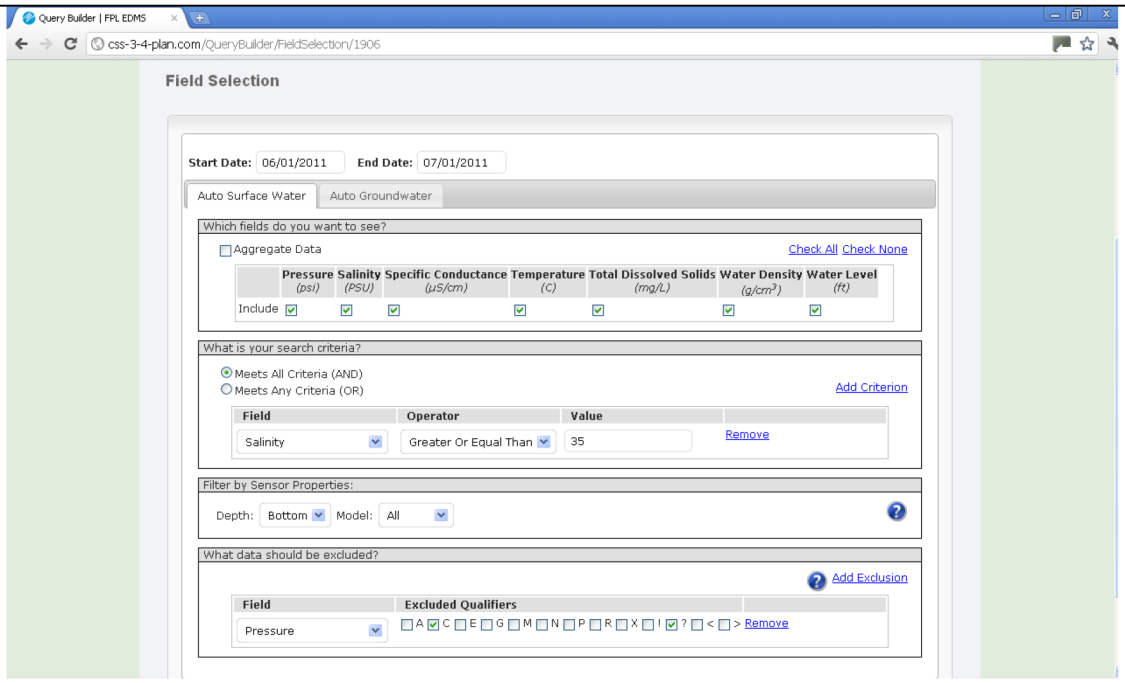


**Figure 4.3-5. Field selection to include or exclude data. The multiple options built-in allow the user significant flexibility in selecting the data of interest.**

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 (≤ 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.

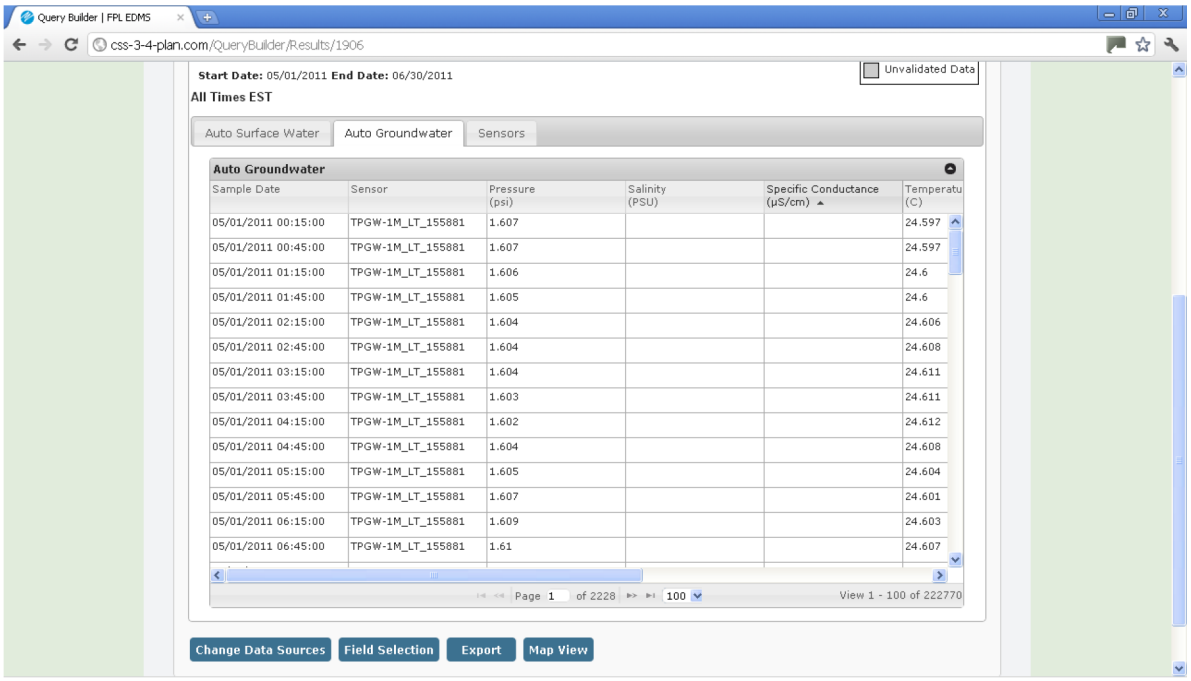


**Figure 4.3-6. Results from data selection process. Surface and Groundwater data are shown in separate sheets. Data can be exported as a zipped text (.csv) file or viewed in a GIS map layer.**

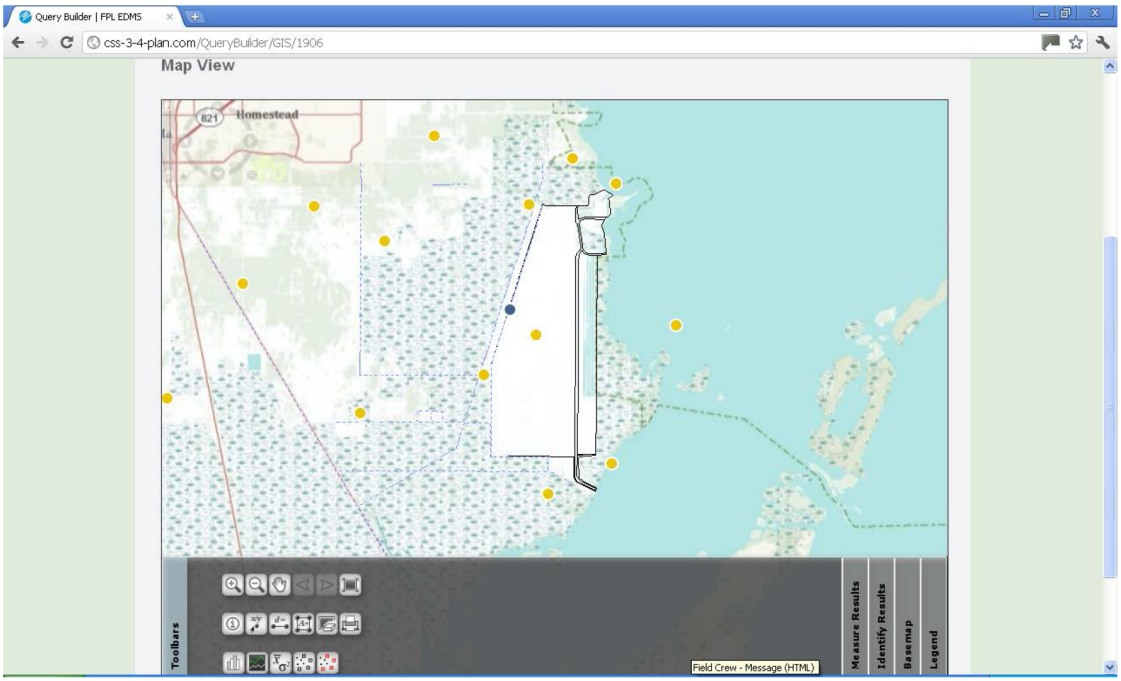


**Figure 4.3-7. GIS map view of the data. The toolbar has a toolkit of features that allow the User to measure distances, view the data at different sites as time-series or histograms.**

#### 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;

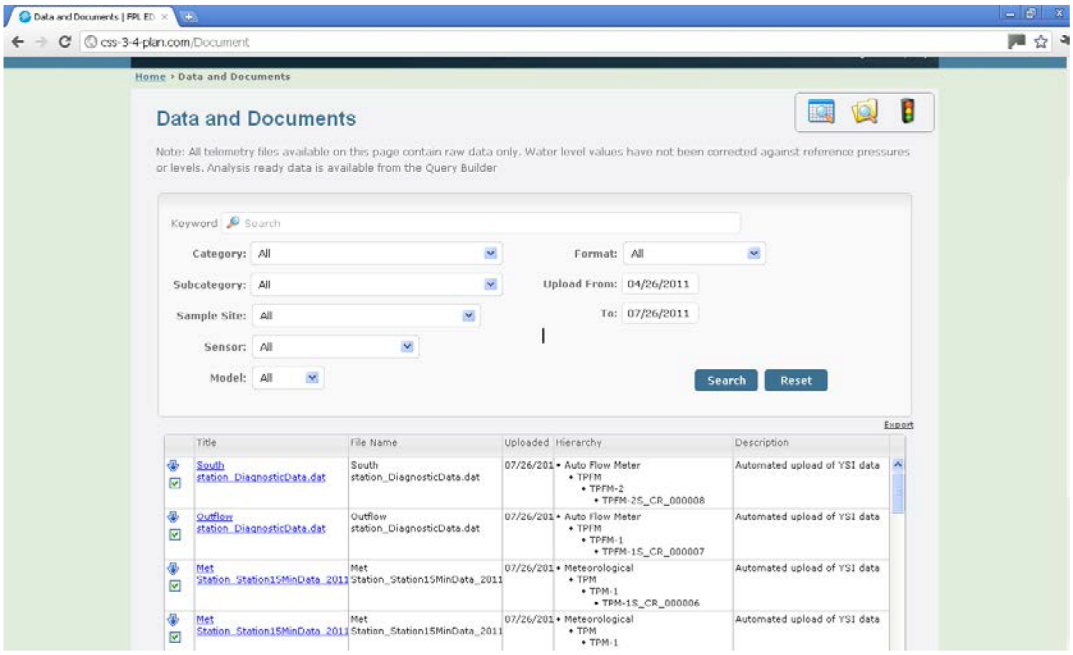


**Figure 4.3-8. Example of the Data and Documents page with the options to select data of interest based on a series of options.**

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(hourly during the post-uprate monitoring period) 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 |

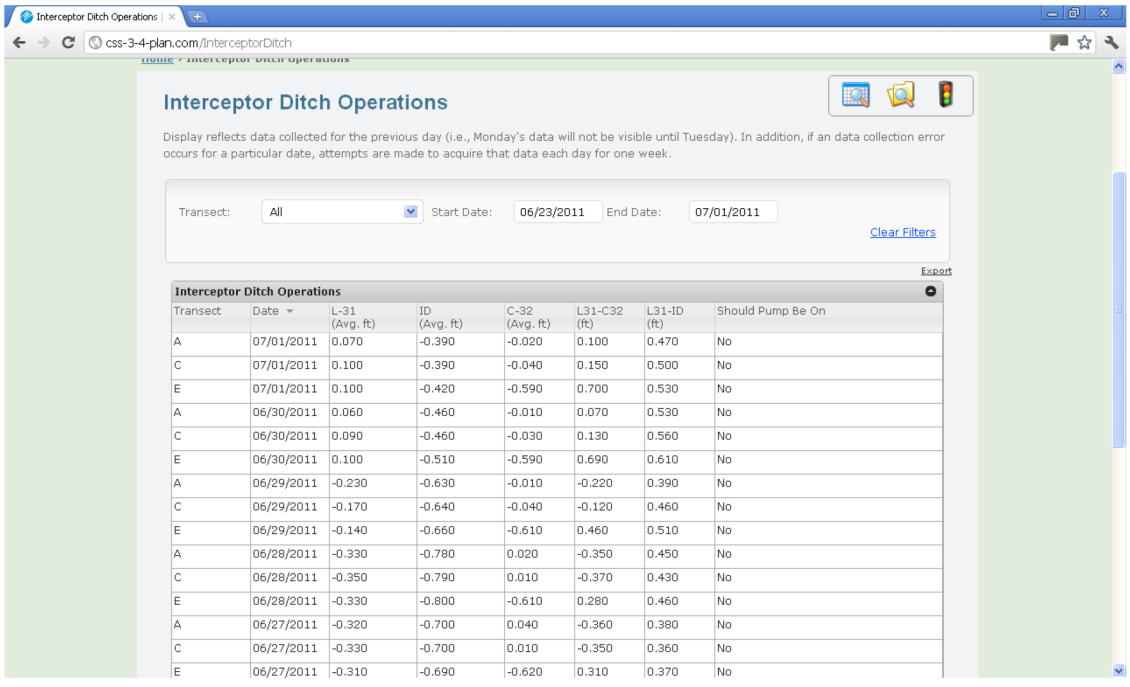


**Figure 4.3-9. Data from the different stations (Table 4.3-1) used to determine if the ID pumps should be turned on.**

#### 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 upon submission of data/findings by USGS | |
| 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 upon submission of the report to the Agencies | 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.

# 5 Performance and System Audits

Performance and System Audits



Audits will be conducted as a principal means to determine compliance with the QAPP. This approach will be used to review the actual performance of the project during its course and throughout all operations and levels of management. Specifically, audits will be conducted for both field and laboratory operations to assess the accuracy of the measurement systems and to determine the effectiveness of QC procedures. Several factors will be taken into consideration for determining the scope and frequency for audits as follows:

- Complexity of the activity;
- Duration and scope of activity;
- Degree of QC specified;
- Criteria to achieve QA objectives;
- Requirements for deliverables;
- Participation of subcontractors;
- Criticality of data collection; and
- Potential for or frequency of nonconformances.

The FPL PM (or their designee) will have responsibility for conducting FPL operated audits and the authority to delegate FPL audits functions, as necessary. For complex or highly specialized tasks, senior technical specialists may be assigned portions of an audit. Both the FPL PM (or their designee) and technical specialists will be familiar with the technical and procedural requirements of both field and laboratory operations, and the associated Monitoring Plan as well as this QAPP. In addition, auditors will not be directly involved with the actual tasks, themselves, so as not to introduce bias in the auditing process.

The audit process includes selecting an audit team, notifying the auditee , pre-audit planning, conducting the audit, identifying nonconformances (if applicable), reporting the audit results, and tracking closure of corrective actions. A process that does not meet the specifications in the QAPP is considered to be a non-conformance and must be resolved through the corrective action procedures described in Section 6. The term "nonconformance" is the same as a deficiency as referred to in F.A.C. 62-160.650. In circumstances where corrective actions have not been completed as planned or scheduled, the audit process provides for management intervention to resolve problems and for issuance of stop work orders, if necessary.

In addition to audits conducted by FPL, Agency personnel shall have access onsite to observe field activities, with annual field audits by the Agencies, and FPL shall provide copies of field-generated notes and logs upon request. If field events are delayed, notification shall be provided to the District and the FPL PM as soon as practical and include the revised field event schedule.. Laboratory audits performed by the Agencies or Agencies' contractors shall be allowed for any facility analyzing samples from this monitoring program, however, all such audits will be coordinated, in advance, with FPL. All Agencies audits conducted pursuant to this QAPP and the Monitoring Plan will be coordinated by the District with the District being the point of contact for activities involving the subject Agencies audit. The District shall coordinate any agency field audits with the FPL PM.

The various types of audits to be conducted during the project are described in the following sections. These audits will be used for the following purposes:

- To verify that measurement systems are operating properly;
- To assess whether data quality is adequately documented;
- To confirm the adequacy of data collection systems; and
- To evaluate management effectiveness to meet QA guidelines.

All audits should be scheduled in advance. Audits should take place at or near the beginning of the project or task start to ensure sufficient time to implement corrective actions. The lead auditor will complete an audit plan and send the plan to the auditee approximately one week before the audit is scheduled. The audit plan should communicate all the requirements to auditee regarding the documents that will be reviewed and any materials or tasks that must be reviewed during the audit. The lead auditor should gather all relevant project documents including any documents referenced that are applicable to the task being audited. The QA officer from FPL or the District (depending on who is conducting the specific audit) shall review and approve the audit plan prior to submittal to the auditee.

The auditor will be responsible for preparing a findings report after completion of the audit and submitting this report to both the FPL PM (or their designee) and the District POC. The findings report will include a short summary of what was audited, copy of completed checklists, statements as to the conformity of the process with the QAPP, notable process improvements, and any deviations from the QAPP or other guidance that have not been fully

documented or approved. The FPL PM (or their designee) will be responsible for initiating corrective actions as described in Section 6. The FPL PM (or their designee) will perform follow-up audits as necessary to confirm the implementation of corrective actions.

## 5.1 Performance Audits

A performance audit will be used to determine the status and effectiveness of both field and laboratory measurement systems. An independent check will be made to obtain a quantitative measure of the quality of data generated. For laboratories, this involves the use of performance evaluation samples analyzed for specific methods for accreditation by NELAC. Laboratories are required under NELAC to routinely analyze performance evaluation for parameters for which they are accredited. These samples have known concentrations of constituents that are analyzed as unknowns in the laboratory. Results of the laboratory analysis will be calculated for accuracy against the known concentrations and acceptance limits provided by the supplier or manufacturer. The FPL PM (or their designee) will audit the last three rounds of performance evaluation from the laboratory to verify compliance with the acceptance limits. For laboratories and/or laboratory parameters that are not accredited by NELAC, other method specific samples will be audited. Depending on the type of test, these samples could include initial demonstration of proficiency samples, secondary source calibration standards, and analysis of other standards with traceability to a certified standard, such as the IAEA VSMOW standard for certain isotope analyses. These results will be evaluated in relation to the QAPP objectives in Section 4.

Field performance will be evaluated using equipment decontamination blanks and field duplicate samples as described in Section 2.6.1, Field QC. Performance evaluation samples are not directly applicable to field samples. Other measures shall be used as a quality indicator of field performance including auditing of trends, review of actual results versus anticipated results, and direct observation of technical personnel performance.

## 5.2 Data Quality Audits

The data quality audit is an examination of data after they have been collected and verified by project personnel. It is conducted to determine how well the measurement system performed with respect to the performance goals specified in this QAPP and whether the data were accumulated, transferred, reduced, calculated, summarized, and reported correctly. It documents and evaluates the methods by which decisions were made during treatment of the data.

Data quality audits shall be conducted at least once per year during the project with an interval between audits of at least 6 months. Data quality audits entail tracing data through their processing steps and duplicating intermediate calculations. A representative set of the data is traced in detail from raw data and instrument readouts through data transcription or transference, through data manipulation (either manually or electronically by commercial or customized software), through data reduction to summary data, data calculations, and final reported data. The focus is on identifying a clear, logical connection between the steps. Particular attention is paid to the use of QC data in evaluating and reporting the data set.

The data quality audit report shall detail the results of custody tracing, a study of data transfer and intermediate calculations, a review of QA and QC data, and a study of project incidents that resulted in lost data. The audit report ends with conclusions about the quality of the data from the project with respect to the DQI goals and their fitness for their intended use.

## 5.3 Technical Systems Audits

A technical systems audit is used to confirm the adequacy of the data collection (field operation) and data generation (laboratory operation) systems. This is an on-site audit that will be conducted to determine whether the QAPP, Monitoring Plan, and SOPs are properly implemented. During the project, technical systems audits will be conducted for the laboratory operation as deemed necessary by the project team. Laboratory audits may be omitted or abbreviated if the laboratory is a current participant in a federal validation program or equivalent state certification program which requires assessments (such as NELAC). However, certification does not always replace an audit relative to project-specific requirements. Certification documentation must be provided for consideration prior to selection of the laboratory. If deemed necessary by the project team, laboratory audits will generally take place near the beginning of the project once samples have been initially analyzed.

Technical systems audits of field activities (ecological and water quality/hydrology audits) will be conducted once per calendar year by FPL and/or the District with an interval between audits of at least 6 months during the field operation. A systems audit of field procedures will evaluate and document, at a minimum, sampling methods (including collection, containers and preservation), equipment decontamination, chain of custody, sample tracking and shipment documentation, sample labeling, methodology, pre-field activities, equipment maintenance and calibration, post-field activities, sampling documentation and other field activity logs, field team debriefing, and equipment check-in and re-calibration. Table 5.3-1 details the checklist to be used during audits of field activities and/or documents, whether it requires an on-site inspection or if a review of the documentation is sufficient, and the frequency with which these audits are to be performed. These audits may be performed together or scheduled separately, but all shall be performed once per year.

**Table 5.3-1. Field Technical Audit Checklists**

| Checklist | Description | Frequency |
|---|---|---|
| Health & Safety | Documentation audit | once per year |
| Universal Documentation | Documentation audit | once per year |
| COC | Documentation audit | once per year |
| Decon | Documentation audit | once per year |
| Field Cal | Documentation audit | once per year |
| Field QC | Documentation audit | once per year |
| Flow and Meteorological Audit | Documentation audit | once per year |
| Maintenance | Documentation audit | once per year |
| Groundwater | On-site audit | once per year |

**Table 5.3-1. Field Technical Audit Checklists**

| Checklist | Description | Frequency |
|---|---|---|
| Surface Water | On-site audit | once per year |
| Ecological | On-site audit | once per year |

A systems audit of laboratory procedures will evaluate and document, at a minimum, methods for: data qualification, analytical data generation, COC documentation and protocol, instrument calibration, data reporting, and QC methods. Systems audits also will evaluate laboratory procedures for procurement of supplies and standards as well as disposal of samples. Table 5.3-2 details the checklist to be used during laboratory audits of NELAC labs, whether it requires an on-site inspection or if a review of the documentation is sufficient, and the frequency with which these audits are to be performed. Audits of laboratories supplying data for the project using non-standard methods (not certified by NELAC) shall be performed at the discretion of FPL and the District. During the data assessment process, if the PM or QA officer identify items requiring an audit, then the audit team will develop the appropriate checklists to employ depending on the specifics of the laboratory.

**Table 5.3-2. Laboratory Technical Audit Checklists**

| Checklist | Description | Frequency |
|---|---|---|
| Laboratory (NELAC) | Documentation audit/ on-site audit; PE samples reviewed; validation monitors performance and signals possible need for on-site audit. | Optional; if validation identifies systemic errors; PM and QA officers discretion |

A systems audit of data management will evaluate and document, at a minimum, methods for data storage, access, custody, security, and archiving of project data. Systems audits will also evaluate data management procedures for tracking changes and access to the data and ensuring only current or the latest versions of data are available for access. Audits conducted by the QA officer or designee shall follow the "FPL Audit Checklist_Data Management" checklist provided in Appendix G when conducting systems audits. Technical systems audits of data management will be conducted at least once per year during the field operation.

Subcontractors will be used to collect and/or generate certain data for the project. These may fall under field or laboratory operations. Subcontractor audits may be performed on new sources or existing sources of services that have had significant changes in personnel, ownership, or quality systems. Audits may be performed to assess a subcontractor's QA program or verify the supplier's capability to supply an item or service in a manner that satisfies the project quality requirements. In addition to the subcontractor's QA program, the audit may include, as appropriate, the subcontractor's facilities, production capabilities, personnel capabilities, process and inspection capabilities, and organization.

## 5.4 Management System Audits

A management systems audit will be used to evaluate the ability of the project management team to meet specified data collection and QA objectives. This type of audit will

not be scheduled. However, if substantial nonconformances are identified from the other scheduled audits, or if programmatic concerns exist for the quality of data and related documentation, then this form of auditing will be employed under the guidance and direction of the FPL PM (or their designee).

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# 6 Corrective Action

Corrective Action



Provisions for establishing and maintaining QA reporting to the appropriate management authority will be instituted to assure that early and effective corrective action will be taken when data quality falls outside of established acceptance criteria described or referenced in this QAPP. In this context, corrective action involves the following steps:

- Discovery of a nonconformance;
- Identification of the responsible party;
- Plan and schedule of corrective/preventive action;
- Review of the corrective action taken;
- Confirmation that the desired results were produced; and
- Reporting/documentation of nonconformance, required corrective actions and verification of corrective actions taken.

The FPL PM (or their designee) is responsible for implementing all corrective actions pertaining to the field activities, and the laboratory director is responsible for implementing all corrective actions pertaining to the laboratory. It is their combined responsibility to see that all sampling and analytical procedures are followed, as specified, that the data generated meet the prescribed acceptance criteria and confirm that all corrective actions are implemented and the results are documented and reported to the District.

It is the intent of the QA process to minimize corrective actions through the development and implementation of effective internal controls. To accomplish this, procedures will be implemented, as described in this section, to activate a corrective action for each measurement system when acceptance criteria have been exceeded. In addition, reviews and assessments will be conducted on a periodic basis to check this implementation.

Results of QA reviews and assessments typically identify the requirement for corrective action.

The discovery of a nonconformance either from observations, data review or from an audit conducted by FPL, laboratory QA officer/director or by the District, shall be documented in writing and promptly sent to the FPL PM. A corrective action plan (CAP) will be prepared by FPL within 45 days of receipt of the documented nonconformance which will include: identification of the nonconformance and the associated corrective action taken; organizational level responsible for the action taken; steps to be taken to implement the corrective action; approval for the corrective action by the FPL PM; verification of the corrective action taken including confirmation that the desired results were achieved; corrections to all prior findings/data impacted by the nonconformance; and transmittal of documentation of these steps to the District.

A corrective action plan in some cases may not affectively address or correct a documented nonconformance. In such cases, a justification for the non-action will be noted along with a statement as to whether the subject data requires qualification. Nonconformance issues that have corrective actions procedures detailed in referenced FDEP SOP's and this QAPP (i.e. calibrations) shall not be required to submit a CAP.

Once the CAP has been received by the District, the Agencies shall have 14 days to provide written comments to the FPL PM pertaining to technical applicability and completeness of the CAP with the QAPP. Failure to complete a CAP shall result in a recommendation that the affected data be qualified and/or rejected.

If data rejected during validation is deemed critical by the FPL PM (or their designee)or the District to meeting the project objectives, reanalysis or resampling (if out of holding time) may be required to fill the data gaps in a manner that meet the project objectives and QAPP criteria.

The FPL PM (or their designee), or any project member who discovers or suspects a nonconformance is responsible for initiating a nonconformance report. The FPL PM (or their designee) will assure that no additional work, which is dependent on the nonconforming activity, is performed until a confirmed nonconformance is corrected.

The FPL PM (or their designee) will be responsible for reviewing all assessment and nonconformance reports to determine areas of poor quality or failure to adhere to established procedures. In addition, the FPL PM (or their designee) will be responsible for evaluating all reported nonconformances, deciding the steps to be taken for correction, and documenting/executing the corrective action plan as described above . Corrective action measures will be selected to prevent or reduce the likelihood of future nonconformances and address the causes to the extent identifiable. Selected measures will be appropriate to the seriousness of the nonconformance and realistic in terms of the resources required for implementation.

Upon completion of the corrective action, the FPL PM (or their designee) will evaluate the adequacy and completeness of the action taken. If the action is found inadequate, the PM will resolve the problem and determine any further actions. Implementation of any further action will be scheduled by the PM.

## 6.1 Field Situations

The need for corrective action in the field may be determined by field assessments or by more direct means such as equipment malfunction. Once a problem has been identified, it may be addressed immediately and the project management staff notified that corrective action is necessary. All corrective actions taken in the field will follow the procedures and comply with the documentation requirements for addressing nonconformance outlined above. In addition, corrective actions made immediately in the field will also be documented in the project logbook.

After a corrective action has been implemented, its effectiveness will be verified. If the action does not resolve the problem, appropriate personnel will be assigned to investigate and effectively remediate the problem.

## 6.2 Laboratory Situations

As described above, all nonconformance shall be documented in writing by the laboratory QA officer or director and sent to FPL's PM however, the need for corrective action as a result of laboratory assessments will be initiated by the laboratory QA officer or director and documented within the lab reports. Corrective actions may include, but are not limited to:

- Reanalyzing samples, if holding times permit;
- Correcting laboratory procedures;
- Recalibrating instruments using fresh standards;
- Replacing solvents or other reagents that give unacceptable blank values;

- Training additional laboratory personnel in correct sample preparation and analysis procedures; and
- Accepting data with an acknowledged level of uncertainty.

Whenever corrective action is deemed necessary, the laboratory director will ensure that the problem is defined, the cause is investigated and determined, an appropriate corrective action is determined, and the action is implemented and verified. The FPL PM will be responsible for working with the laboratory director to ensure that the procedures and documentation requirements for addressing any laboratory nonconformance are complied with.

## 6.3 Long-Term Corrective Actions

Long-term corrective actions refers to overall changes in the QA program or project made in response to any problems found after examination of field and/or laboratory QC samples, laboratory control charts, field and/or laboratory assessments, and/or validation. Long-term corrective actions target the overall systems of performance to help alleviate continual quality problems with instrumentation or sample analysis or to prevent recurrence of one-time incidents. When long-term corrective actions are implemented, the PM will evaluate the impact on previously generated data and determine whether appropriate qualification should be added to previous data sets. In addition, the FPL PM shall make an assessment of whether the long term corrective action is consistent with provisions of the approved QAPP and request revisions to the QAPP in writing to the District if necessary.

# 7 References

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- D5753-95e1 Standard Guide for Planning and Conducting Borehole Geophysical Logging.
- ASTM D6167-97(2004) Standard Guide for Conducting Borehole Geophysical Logging: Mechanical Caliper.
- ASTM D6274-98(2004) Standard Guide for Conducting Borehole Geophysical Logging-Gamma.
- ASTM D6726-01 Standard Guide for Conducting Borehole Geophysical Logging-Electromagnetic Induction.

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- FC 1000 Cleaning / Decontamination Procedures
- FD 1000 Documentation Procedures
- FM 1000 Field Planning and Mobilization
- FQ 1000 Field Quality Control Requirements
- FS 1000 General Sampling Procedures
- FS 2000 General Aqueous Sampling
- FS 2100 Surface Water Sampling
- FS 2200 Groundwater Sampling
- FS 4000 Sediment SamplingFT 1000 General Field Testing and Measurement
- FT 1100 Field Measurement of Hydrogen Ion Activity (pH)
- FT 1200 Field Measurement of Specific Conductance
- FT 1400 Field Measurement of Temperature
- FT 1500 Field Measurement of Dissolved Oxygen
- FT 1800 Field Measurement of Water Flow and Velocity
- FT 1900 Continuous Monitoring With Installed Meters

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- LD 1000 Laboratory Documentation
- LQ 1000 Laboratory Quality Control

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# 8 Revisions

Revisions to the QAPP may be needed periodically to address equipment replacement, District approved changes to analytical or field procedures, revised/new sampling locations, data collection protocols and sampling frequencies. All revision to this QAPP shall comport with the specifications and requirements of the Fifth Supplemental Agreement and incorporated FPL Turkey Point Power Plant Groundwater, Surface Water and Ecological Monitoring Plan.

Requests for changes to the QAPP shall be submitted in writing at least 60 days prior to the intended modification for review and approval by the District. Exceptions to the 60 day advance notice requirement shall be granted by the District based on demonstrated good cause (such as a sudden loss of equipment where rapid resolution is needed to prevent/minimize a break in continuity of time series data collection). The District shall approve or deny the request in writing, within 30 days. However, nothing in this section shall be construed to authorize FPL to deviate from this QAPP without prior written approval from the District. Requests for changes to the QAPP proposed by FPL shall, at a minimum, include the following information:

- Specific locations and type of monitoring impacted by proposed modification.
- Justification /basis for request including supporting data if needed or requested;
- Specific text to be inserted ,deleted and/or modified;
- Identification of any text or provisions contained in the Monitoring Plan that could conflict with the proposed QAPP changes along with proposed revision language for the Monitoring Plan which would prevent a conflict between the two documents.

Once a revision has been approved in writing by the District, the revision date will be stated at the bottom of each affected page in

the QAPP. In addition, a description of each approved revision will be appended to Table 8-1. The last date entered in Section 8 (Table 8-1) will correspond to the current and active copy of the QAPP.

## June 2013 Revisions to the December 2011 Approved QAPP

**Table 8-1. Chronological QAPP Revision Dates**

| Revision description and # | Revision Date | Section | Page | Changes, Additions, Deletions | Basis |
|---|---|---|---|---|---|
| Initial draft QAPP V.1 12/15/09 | 2/23/10, 3/16/10, | various | various | See Agencies' spreadsheet comments and FPL responses | Address clarifications and omissions |
| Porewater protocols | 3/16/10 | Appendix A | various | Incorporate Agencies' comments for approval | Approval of procedures prior to broadscale sampling |
| Revised draft QAPP V.2 4/30/10 | 6/14/10, 8/4/10 | various | various | See Agencies' spreadsheet comments and FPL responses | Address clarifications and omissions |
| Revised draft QAPP V.3 8/10/10 | 11/16/10, | various | various | See Agencies' text changes in Word | Address clarifications and omissions |
| Revised draft QAPP V.4 | 2/4/11, thru 6/13/11 | various | various | Incorporated prior revisions and updated information | Final Draft produced by District for FPL last look and comments |
| Final District Approved QAPP | 12/02/11 | all | all | | Approved/Original QAPP |
| 2013 Approved QAPP | 6/2013 | 1, 2, 3, 4, 5, 6, 8, Appendix B-3, Appendix E | | Summarized in Table 8-2 | Revisions based on Pre-Uprate monitoring lessons learned, field and lab audit recommendations, and revisions to the Monitoring Plan |
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## June 2013 Revisions to the December 2011 Approved QAPP

**Table 8-2. Summary of June, 2013 Revisions to the December, 2011 Approved QAPP**

| Section | Approved QAPP Dec 2011 | Agencies Recommendations |
|---|---|---|
| **Section 1** | | |
| **1.1** | The 2003 National Environmental Laboratory Accreditation Conference (NELAC) Standard, EPA/600/R-04/003, June 2003; | **Modify approved QAPP as follows:**<br>The 2003 National Environmental Laboratory Accreditation Conference (NELAC) Standard, EPA/600/R-04/003, June 2003 or the NELAP standard 2009 revision (TNI), as applicable. The NELAC standards will be followed until official promulgation of TNI endorsed standards by Florida Statutes. |
| **1.3** | A summary of performance in meeting these DQOs shall be included in the semi-annual and annual reports along with the specific methods, assumptions, documentation, justification and calculations used to validate the assessment. | **Modify approved QAPP as follows:**<br>A high-level summary of performance in meeting these DQOs similar to the level provided in the Comprehensive Pre-Uprate Report shall be included in the ~~semi-annual and~~ annual reports along with the specific methods, assumptions, documentation, justification and calculations used to validate the assessment. Inclusion of all applicable DUS reports for the reporting period satisfies this requirement. |
| **1.3.2** | Given the high variation in salinity expected in project samples, the method accuracy criteria may not be representative. If spike recoveries for a particular analyte or method consistently fall outside accuracy objectives, alternative ranges may be proposed consistent with the provisions and timelines contained in section 3.3 of the Monitoring Plan | **No Changes to the approved QAPP needed**<br><br>**Modify section 3.3 of the Monitoring Plan as follows:**<br>"…Any request for long-term modification of sampling or analytical procedures shall be submitted in writing at least ~~90~~45 days prior to the implementation of the intended modification for review and approval by the Agencies. Agencies' response will be provided to FPL in writing within 45 days of receipt of the modification request. |
| **Section 2** | | |
| **2.1.1** | **2.1.1 Logbooks**<br>Documentation on samples taken, including:<br>– Sampling location, | **Modify approved QAPP as follows:**<br><br>– Required analyses, ~~and~~ |

## June 2013 Revisions to the December 2011 Approved QAPP

| Section | Approved QAPP Dec 2011 | Agencies Recommendations |
|---|---|---|
| | – Sample matrix….<br>– Required analyses, and<br>– Sample preservation and verification of preservation | – Sample preservation and verification of preservation. and<br>– The type and source (and lot if available) of water used for decontamination or blank preparation |
| **2.1.2** | In some cases, it will be advantageous to record field data on data sheets rather than in field logbooks. In some cases, field data sheets shall be numbered and referred to in the logbooks. | **Modify approved QAPP as follows:**<br>In some cases, it will be advantageous to record field data as well as sample collection and well purging documentation on data sheets rather than in field logbooks. In some cases, field data sheets shall be numbered and referred to in the logbooks. |
| **2.2.5** | Subplots will be named in ascending order starting clock-wise from the north. | **Revise Approved QAPP as follows:**<br>Subplots will be named in ascending order starting clock-wise from the northeast. |
| **2.4** | A total of 38 automated stations (1 meteorologic, 3 flow, 14 groundwater and 20 surface water) will be established in and around the CCS of which 29 stations will have telemetry. | **Revise Approved QAPP as follows:**<br>A total of 38 automated stations (1 meteorologic, 3 flow, 14 groundwater and 20 surface water) ~~will be~~ were established in and around the CCS during the pre-uprate monitoring period, of which 29 stations will have telemetry. Details regarding the post-uprate automated stations are included in the 2013 revised Monitoring Plan. |
| **2.4** | Fourteen groundwater well clusters (i.e., 42 wells) with a total of 84 probes will be established in the Monitoring Plan. | **Revise Approved QAPP as follows:**<br>Fourteen groundwater well clusters (i.e., 42 wells) with a total of 84 probes ~~will be~~ were established during the pre-uprate monitoring period as prescribed in the Monitoring Plan. Details regarding the post-uprate groundwater well clusters are included in the 2013 revised Monitoring Plan. |

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| **2.4** | The probes will measure stage at 15-minute intervals and be referenced to a surveyed control elevation. | **Revise approved QAPP as follows:**<br>The probes will measure stage at 15-minute intervals (one hour intervals for post-uprate monitoring) and be referenced to a surveyed control elevation. |
| **2.4** | Probes will be checked for fouling during routine maintenance, initially proposed at six-week intervals for surface water Biscayne Bay stations, and at eight-week intervals for all other surface water stations and groundwater wells. | **Revise approved QAPP as follows:**<br>…initially proposed at six-week intervals for surface water Biscayne Bay stations, and at eight-week intervals for all other surface water stations and groundwater wells (eight to ten week intervals during post uprate monitoring). |
| **2.4** | There will be a total of 20 automated surface water stations and one manual monitoring station installed throughout the project area. | **Revise QAPP as follows:**<br>~~There will be a total of 20~~ The specific number and location of automated and manually monitored surface water stations during the pre and post uprate monitoring periods are detailed in the Monitoring Plan ~~and one manual monitoring station installed throughout the project area~~. |
| **2.4** | Where mean water depths are in excess of 3 feet, two probes (one stage, temperature, and specific conductance probe; and a second probe with only temperature and specific conductance) will be deployed. Only one probe (stage, temperature, specific conductance) will be deployed at locations where mean water levels are <3 feet unless noted otherwise in the Monitoring Plan. The probe that includes stage measurements will be located at a surveyed location approximately 3 feet below minimum water level. The second probe (temperature and specific conductance) will be located approximately 1 foot from the bottom. | **Revise approved QAPP as follows:**<br>Where specified in the Monitoring Plan~~mean water depths are in excess of 3 feet~~, two probes (one stage, temperature, and specific conductance probe; and a second probe with only temperature and specific conductance) will be deployed. ~~Only one probe (stage, temperature, specific conductance) will be deployed at locations where mean water levels are <3 feet unless noted otherwise in the Monitoring Plan.~~ The probe that includes stage measurements will be located at a surveyed location approximately 3 feet below minimum water level if water levels permit. The second probe (temperature and specific conductance) will be located approximately 1 foot from the bottom. |
| **2.4** | All equipment will be tested prior to startup to ensure data are being properly recorded and transmitted. All testing and training done will be documented,… | **Modify approved QAPP as follows:**<br>All new or replaced equipment will be tested prior to startup and associated documentation of the testing recorded to ensure data |

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| | | are being properly recorded and transmitted. All ~~testing and~~ training associated with new or replaced equipment ~~done~~ will be documented,… |
| **2.4** | Data from each automated station will be collected at 15-minute intervals from the top of each hour and uploaded to a database… | **Modify approved QAPP as follows:** Data from each automated station will be collected at 15-minute intervals (one hour intervals during post-uprate monitoring) from the top of each hour and uploaded to a database… |
| **2.4.1** | An initial schedule of two month-intervals is proposed for routine maintenance and calibration of the groundwater wells, CCS, and Interceptor Ditch Stations, while all the other surface water stations (L-31 Canal, S-20 Discharge Canal, Card Sound Canal, and Biscayne Bay) will be visited at six-week intervals after installation. This schedule may be adjusted as the work progresses based on operation of the probes in the different environments. | **Modify approved QAPP as follows:** This schedule may be adjusted as the work progresses based on operation of the probes in the different environments and logistical considerations. |
| **2.4.1** | Chronological Calibration Bracket: … If historically generated data demonstrate that a specific instrument remains stable for longer or shorter periods of time, the time interval will be adjusted based on the shortest interval the instrument remains stable upon approval by the District. | **Modify approved QAPP as follows.** Chronological Calibration Bracket: … If historically generated data demonstrate that a specific instrument remains stable for longer or shorter periods of time, the time interval will be adjusted based on the shortest interval the instrument remains stable ~~upon approval by the District~~. All maintenance and calibration data relied upon to make such determinations shall be provided in the subsequent semi-annual or annual report. |

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| **2.4.1** | If an initial calibration or verification fails to meet the acceptance criteria during a sampling event, the probe will be immediately re-calibrated following a specific initial calibration procedure or removed from service. | **Modify approved QAPP as follows:**<br>If an initial calibration or verification fails to meet the acceptance criteria during a ~~sampling~~ cleaning and calibration event, the probe will be immediately re-calibrated following a specific initial calibration procedure or removed from service. |
| **2.4.1** | The continuing calibration verification of the automated sensors will be verified on a six- to eight-week schedule. | **Modify approved QAPP as follows:**<br>The continuing calibration verification of the automated sensors will be verified on ~~a six- to~~ an eight-to-ten week schedule. |
| **2.4.1** | The criteria listed in Table 2.4-1 also apply to the secondary confirmation instrument readings. If the criteria readings for the second instrument confirmation are exceeded the criteria stated in DEP SOP FT1900.2.3, then the continuing calibration verification process will be initiated for the original, dedicated instrument. | **Modify approved QAPP as follows:**<br>~~The criteria listed in Table 2.4-1 also apply to the secondary confirmation instrument readings.~~ If the ~~criteria~~ readings for the second instrument confirmation ~~are~~ exceed~~ed~~ the criteria stated in DEP SOP FT1900.2.3, then the continuing calibration verification process will be initiated for the original, dedicated instrument. |
| **2.4.1** | Calibration must be performed each time the probe is taken off-line, after every preventative maintenance activity, and immediately after determining that the criteria verifications in the list above are not met. Records of calibration and maintenance efforts (discussed in Section 2.1) will be kept for each probe. | **Modify approved QAPP as follows:**<br>~~Calibration must be performed each time the probe is taken off-line, after every preventative maintenance activity, and immediately after determining that the criteria verifications in the list above are not met.~~ Calibration verification is to be performed within 24-hours of probe deployment, probe replacement, after every probe cleaning activity, and immediately after determining that the criteria verifications in the list above are not met. Initial calibration must be performed prior to redeployment of a new probe or if the CCV fails. Records of calibration and maintenance efforts (discussed in Section 2.1) will be kept for each probe. |
| **2.4.3** (Table | **Table 2.4-2** | **Modify approved QAPP as follows:** |

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| 2.4-2) | | - Revise 'Maintainability' from ~~2 hours~~ to 7 days<br><br>Edit superscripts 2 and 3 to read:<br><br>2 = failure repaired within guideline timeframe for 95% of all incidents except for remote stations that are identified in the Monitoring Plan<br>3 = real-time delay for stations with telemetry and post-processing delay (except for times when cell-phone towers are intermittently reporting, which may last several weeks) |
| **2.5** | **Table 2.5-2** | **Modify approved QAPP as follows:**<br>Revisions to Table 2.5-2 identified in Attachment A below |
| **2.5.1** | 7. Perform calibration verification at the end of the day, verify the criteria in Table 2.5.2 is met, and record all findings. | **Modify approved QAPP as follows:**<br>7. Perform calibration verification ~~at the end of the day~~ within 24 hrs of calibration or previous CCV, verify criteria… |
| **2.5.2** | Digital thermometers shall be verified prior to use by comparison with a NIST-traceable thermometer and shall agree within ± 0.5°C. Alternatively, NIST-traceable field thermometers may be used. | **Modify approved QAPP by appending the following text:**<br>Alternatively, NIST-traceable field thermometers may be used. Verification against NIST-traceable thermometer is performed once a month or before a sampling event whichever is longer. |
| **2.5.6** | The measurements will be taken at the top of casing … time of surveying. | **Modify approved QAPP as follows:**<br>The measurements will be taken at the top of casing … time of surveying or the north side of casing if the survey markings are not visible. |
| **2.5.6** | The water level indicator will be rinsed with de-ionized water between well locations. | **Modify approved QAPP as follows:**<br>The water level indicator will be rinsed with de-ionized water between well locations. Should evidence of electronic water level indicator equipment contamination be observed, cleaning procedures shall follow those stated in Section 2.6.2.4. |

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| **2.6**<br>(Table 2.6-1) | **Table 2.6-1.** Locations and Frequency of Analytes Collected | **Modify approved QAPP as follows:**<br>Add the following subscripts definitions to the table:<br>1. Listed in Table 2.1 of the Turkey Point Monitoring Plan<br>2. Potential cooler temperature anomaly based on thermal imagery. Measured only one-time at Agency-designated location.<br>3. Monitored semiannually for one year in all surface water stations located within the CCS |
| **2.6**<br>(Table 2.6-2) | **Table 2.6-2.** Categories of Analytes from Groundwater (GW) with or without Nutrients, Surface Water (SW), Cooling Canal Water (CCS), and Porewater (PW) | **Modify approved QAPP as follows:**<br>Revisions to Table 2.6-2 clarifying sampling frequencies are identified in Attachment B below |
| **2.6.1** | The following section outlines field QC samples to be collected in accordance with DEP-SOP-001/01 – FQ1000 Field QC Requirements. | **Modify approved QAPP to add the following:**<br>The following section outlines field QC samples to be collected in accordance with DEP-SOP-001/01 – FQ1000 Field QC Requirements. A single source of water shall be used to prepare blanks with the exception of blanks analyzed for tritium. Blanks for tritium analysis shall use tritium-free water. |
| **2.6.1.1** | Equipment blanks are used to assess the effectiveness of equipment decontamination procedures. Equipment blanks will be collected at a frequency of one blank per equipment type per matrix per day. Equipment blanks will be collected each day the equipment is used prior to sampling… | **Revise approved QAPP as follows:**<br>Equipment blanks are used to assess the effectiveness of equipment decontamination procedures and contamination of samples through the use of new equipment. Equipment blanks will be collected ~~at a frequency of one blank per equipment type per matrix per day~~ as a single pre-cleaned equipment blank at the start of the quarterly event according to DEP-SOP-001/01 FQ 1000. Equipment blanks will be collected each day ~~the~~ new equipment is used prior to sampling…" |

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| **2.6.1.2** | Field blanks are required only when no other blank is collected. Field blanks consist of analyte free water poured into sample bottles and analyzed for all parameters collected during the event. Field blanks shall be collected in accordance with DEP-SOP-001/01 FQ 1000 | **Modify approved QAPP as follows:** Field blanks are required each sampling day nutrient, trace metals or tritium samples are collected if ~~only when~~ no other blank is collected. Field blanks consist of analyte free water poured into sample bottles on-site in the field and analyzed for all applicable parameters for that specific sampling day ~~collected during the event~~. Field blanks shall be collected in accordance with DEP-SOP-001/01 FQ 1000 for porewater samples. |
| **2.6.1.4** | Field split samples will be collected if the Agencies require split samples for analysis by different laboratories for comparison purposes. | **Modify approved QAPP as follows.** …split samples for analysis by different laboratories for comparison purposes. The District shall notify FPL 30 days in advance if split samples are required. |
| **2.6.2** | The effectiveness of any cleaning procedure (including all cleaning reagents) must be supported by equipment blanks with reported non-detected values. | **Modify approved QAPP as follows:** The effectiveness of any cleaning procedure (including all cleaning reagents) must be supported by equipment blanks with reported non-detected values. A single source of water shall be used to perform decontamination. |
| **2.6.2.2** | This equipment must also be cleaned if it is removed for maintenance or repair at any time. | **Modify approved QAPP as follows:** This equipment must also be cleaned if it is removed for maintenance or repair at any time. Filter apparatuses to be used for samples requiring filtration shall be flushed with ample amounts of site water prior to collection. In addition, while the filter is upright, site water shall be pumped through the filter to expel any atmospheric oxygen in the filter. Sample containers shall not come in direct contact with the ground or other potentially contaminated material. Bottles that contact the ground must be rinsed with adequate amounts of AFW or replaced. |
| **2.6.2.4** | Before use, all groundwater/surface water containers without preservatives must be rinsed one | **Modify approved QAPP as follows:** Before use, all groundwater and surface water containers without |

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| | time with site water before filling with a sample. Do not rinse containers that contain preservatives. | preservatives must be rinsed one time with site water before filling with a sample~~.~~ unless the bottles are certified as having been cleaned. The same procedure (rinsing the bottle unless the bottles are certified as having been cleaned) shall be followed for the blank samples. Do not rinse containers that contain preservatives. |
| **2.6.3** | Amber glass bottles are used routinely where glass containers are specified in the sampling protocol | **Modify approved QAPP as follows:**<br><br>~~Amber glass bottles are used routinely where glass containers are specified in the sampling protocol~~ |
| **2.6.3** | Samples requiring filtration, (i.e. silica, SRP, $NH_3$, $NO_X$, DOC, DIC, and strontium) in the field will be filtered on-site | **Modify approved QAPP as follows:**<br>Samples requiring filtration, (i.e., carbon isotopes, silica, SRP, $NH_3$, $NO_X$, DOC, DIC, and strontium) in the field will be filtered on-site. Filters will be purged with site water for a volume recommended by the manufacturer to eliminate atmospheric oxygen and is adequate to remove contaminants left over from the manufacturing process. |
| **2.6.3** | **Table 2.6-3.** Groundwater and Surface Water Sample Volumes, Container Types, Preservation, and Holding Time Requirements | **Modify approved QAPP as follows:**<br>Revisions to Table 2.6-3 clarifying Groundwater and Surface Water Sample Volumes, Container Types, Preservation, and Holding Time Requirements are identified in Attachment C below. |
| **2.6.3** | **Table 2.6-6.** Porewater Sample Volumes, Container Types, Preservation, and Holding Time Requirements | **Modify approved QAPP as follows:**<br>Revisions to Table 2.6-6 clarifying Porewater Sample Volumes, Container Types, Preservation, and Holding Time Requirements are identified in Attachment D below. |
| **2.6.4.1** | SW Sampling:<br><br>When using the PVC tubing method the drop pipe must be lowered to a predetermined depth measured from a point on the sampling platform in order to | **Modify approved QAPP as follows:**<br>When using the PVC tubing method ~~the drop pipe must be lowered to a predetermined depth measured from a point on the sampling platform in order to ensure the tubing does not disturb the bottom sediments.~~, both the surface and bottom collection tubing should |

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| | ensure the tubing does not disturb the bottom sediments. | be affixed to the pole before lowering to the bottom. In this procedure, the surface sample should be collected first, allowing time for the bottom disturbance to either settle or be carried away by the current. The PVC pole should be placed on the bottom to avoid drift and further disturbance." |
| **2.6.4.2** | Additional sets of stabilization readings will be taken no sooner than 2 minutes apart after the initial set until three sets of readings are within the required limits. | **Modify approved QAPP as follows:**<br>…required limits~~.~~ as specified in FDEP SOP FS2212 subsections 3.1 and 3.5. If five readings are taken and stabilization has not occurred, sampling will proceed according to FS2212.3.6 and this will be documented in the field notes and DUS. |
| **2.6.4.4** | Specific conductance and temperature values will be recorded in field books or on field datasheets; all other data (actual conductance, TDS, water density, salinity, resistivity) will be provided in raw data formats (e.g., csv or MSExcel). | **Modify approved QAPP as follows:**<br>Specific conductance and temperature values will be recorded ~~in field books or~~ on field datasheets; ~~all other data (actual conductance, TDS, water density, salinity, resistivity)~~ data will be provided in raw data formats (e.g., csv or MSExcel). |
| **2.6.4.5** | A total of ~1000 mL of water (per Table 2.6-6) will be collected in either new or pre-cleaned bottles (per DEP standards) provided by the laboratories | **Modify approved QAPP as follows:**<br>A total of ~~1000~~ 1500mL of water (per Table 2.6-6) will be collected in either new or pre-cleaned bottles (per DEP standards) provided by the laboratories |
| **2.6.4.5** | Samples collected will be stored in ice as needed, and Parafilmed. | **Revise approved QAPP as follows:**<br>Samples collected will be stored in ice as needed~~, and Parafilmed~~. |
| **2.6.4.5** | The sample pH will be verified within 15 minutes of sample collection to ensure proper preservation before storage. | **Modify approved QAPP as follows:**<br>The sample pH will be verified within 15 minutes of sample collection to ensure proper preservation before storage. However, some of the porewater sampling locations are remote and only accessible by long hikes through the mangroves, making it impractical to have samples composited, distributed into sample bottles and sample pH verified within 15 minutes of collection (as per groundwater/surface water |

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| | | sampling). Instead, when visiting remote terrestrial ecological sites, porewater sampling will be the last activity performed at each location and the uncomposited samples placed on ice immediately after collection. Once the field team returns to the field vehicle, the samples will be composited and distributed, and the pHs will be verified. The time interval between porewater sample collection and sample distribution will be recorded on field data sheets. For samples which required preservation and filtering, the data will be qualified with a 'J' qualifier and carry the following comment in the database: "Sample processing not complete within 15 minutes of sample collection". "J" qualified data under this circumstance is to be considered useable by the Agencies absent any other qualifiers. |
| **2.6.4.5** | Samples requiring filtration, (i.e. silica, SRP, $NH_3$, $NO_X$, DOC, DIC, and strontium) in the field will be filtered on-site. | **Revise QAPP as follows:** Samples requiring filtration, (i.e. silica, SRP, carbon isotope, $NH_3$, $NO_X$, DOC, DIC, and strontium) in the field will be filtered on-site. |
| **2.6.4.6** | Bulk density (wet and dry) will be estimated as described in Blake and Hartage (1986). Samples will be placed in a container of known weight and wet weight measured. | **Modify approved QAPP as follows:** Bulk density (wet and dry) will be estimated as described in ~~Blake and Hartage (1986)~~ NELAC-certified method ASA-13. Samples will be placed in a container of known weight and wet weight measured. |
| **2.6.5** | Samples shall be collected to minimize headspace (i.e. evaporation) for shipping and storage; | **Modify approved QAPP as follows:** To the degree possible, samples shall be collected to minimize headspace (and potential for ~~i.e.~~ evaporation) for shipping and storage |
| **2.6.6.1** | The custody record must also indicate any special preservation techniques necessary or whether the samples need to be filtered. | **Modify approved QAPP as follows:** The custody record must also indicate any special preservation techniques necessary ~~or whether the samples need to be filtered~~. |

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| **2.6.6.1** | The sample volume level can be marked by placing the top of the label at the appropriate sample height or by using a waterproof marker. | **Modify approved QAPP as follows:** ~~The sample volume level can be marked by placing the top of the label at the appropriate sample height or by using a waterproof marker.~~ If the sample height does not reach the neck of the bottle, a waterproof marker will be used to show sample level. |
| **2.6.6.1** | All sample bottles shall be placed in plastic bags | **Modify approved QAPP as follows:** All sample bottles shall be placed in plastic bags prior to placing in ice. |
| **2.7** | Several stations are proposed to measure velocity and, subsequently, flow at strategic locations in the CCS. Three flowmeters are proposed, one each where water enters and exits the CCS, and a third at the southern end of the CCS before the water enters the Grand Canal (Figure 2.7-1). A Sontek Argonaut® -SL side looking acoustic Doppler current meter (SL 500) that can assess flow across the complete width of the CCS canal is proposed (see Appendix I). Data from the current meters will be collected at 15-minute intervals and electronically uploaded at the end of each day or on a regular basis. This information will be used as part of the water budget to help estimate water losses and gains in the CCS. | **Modify approved QAPP as follows:** ~~Several stations are proposed to measure velocity and, subsequently, flow at strategic locations in the CCS.~~ Three flowmeters ~~are proposed~~, one each where water enters and exits the CCS, and a third at the southern end of the CCS before the water enters the Grand Canal (Figure 2.7-1) were installed during the pre-uprate monitoring period. A Sontek Argonaut® -SL side looking acoustic Doppler current meter (SL 500) that can assess flow across the complete width of the CCS canal ~~is proposed~~ was deployed (see Appendix I). Data from the current meters ~~will be~~ were collected at 15-minute intervals and electronically uploaded at the end of each day or on a regular basis. This information ~~will~~ was to be used as part of the water budget to help estimate water losses and gains in the CCS. However, during development of the water and salt budget methodologies, it was determined that CCS flow data would not be a specific parameter in the approved budget calculations. Accordingly, continuous flow monitoring from the three original sites within the CCS will not be required during post-uprate monitoring. |
| **2.8** | **Table 2.8-2.** Additional Quality Guidelines – | **Modify approved QAPP as follows:** |

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| | Meteorological Station | - Revise 'Maintainability' from ~~2 hours~~ to 7 days<br>- Revise 'Completeness' from ~~95~~ to 90%<br>- Edit superscripts 2 and 3 to read:<br>[2] = failure repaired within guideline timeframe for 95% of all incidents except for remote stations that are identified in the Monitoring Plan<br>[3] = real-time delay for stations with telemetry and post-processing delay (except for times when cell-phone towers are intermittently reporting, which may last several weeks) |
| **2.9.3.1** | The specific start point of each transect will be a function of access and subsequent findings from the transect assessment of porewater conductance and temperature assessments every 500 meters along the proposed transect. | **Modify approved QAPP as follows;**<br>… porewater conductance and temperature assessments ~~every 500 meters along the proposed transect~~ at intervals that were agreed to by the Agencies based on field conditions in November 2010. |
| **2.9.3.2** | The number of individuals (i.e., abundance) and species (i.e., composition) of herbaceous and woody plants within one 1 m and 5 m subplot per plot will be identified to calculate species diversity using the Shannon-Wiener Index of Biodiversity and determine species Evenness (Kempton 1979) and Importance Values (Table 2.9-2). | **Modify approved QAPP as follows:**<br>The number of individuals (i.e., abundance) and species (i.e., composition) of herbaceous and woody plants within one 1 m and 5 m subplot per plot will be identified in the semiannual and annual monitoring reports. Calculation of species diversity using the Shannon-Wiener Index of Biodiversity and ~~determine~~ determination of species Evenness (Kempton 1979) and Importance Values (Table 2.9-2) will be conducted and reported in the annual monitoring reports. |
| **2.9.3.2** | Using the Institute for Regional Conservation's online Floristic Inventory of South Florida database, a list of trees present in Biscayne National Park will be generated. This list will serve as a baseline guide to distinguish trees from shrubs. | **Modify approved QAPP as follows:**<br>Using the ~~Institute for Regional Conservation's online Floristic Inventory of South Florida database,~~ Guide to the Vascular Plants of Florida (Wunderlin and Hansen 2011), a list of trees present in ~~Biscayne National Park~~ the sampling plots will be generated. |

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| **2.9.3.2** | Faunal sampling within Biscayne Bay will be associated with the transect set up for BBCA assessment. | **Modify approved QAPP as follows:** Faunal sampling within Biscayne Bay will be associated with the transect set up for BBCA assessment. Faunal sampling within the Bay was conducted during the pre-uprate monitoring period. Evaluation of the resulting data lead to the decision to eliminate the faunal sampling during the post uprate monitoring period as reflected in the revised Monitoring Plan, 2013. |
| **2.10** | Prior to the initiation of work, FPL will obtain information from the entity conducting the CRP and DTS survey regarding experience of staff, specific equipment to be utilized, and field QA/QC procedures that will be implemented; this information, together with the field and analytical procedures, will be added to an appendix when available. | **Modify approved QAPP as follows:** ~~Prior to the initiation of work,~~ FPL will obtain information from the entity conducting the CRP and DTS survey regarding experience of staff, specific equipment to be utilized, and field QA/QC procedures that will be implemented; this information, together with the field and analytical procedures, will be added to an appendix ~~when~~if available. |
| **2.12** | Details regarding the District's approved methodology will be included in first annual report. | **Modify approved QAPP as follows:** Details regarding the District's approved methodology will be included in ~~first annual report~~ the Comprehensive Pre-Uprate Monitoring Report. |
| **Section 3** | | |
| **3.1** | Laboratory audits performed by FPL (or their designee) will be allowed for any facility analyzing samples from this monitoring program and will respond to the recommended corrective actions in a timely manner. | **Modify approved QAPP as follows:** Laboratory audits performed by FPL (or their designee) or jointly by FPL and the District will be allowed for any facility analyzing samples from this monitoring program and will respond to the recommended corrective actions in a timely manner. |
| **3.1** | **Table 3.2-1** Analytical Methods and Default QA/QC Targets for Groundwater, Surface Water, Porewater, | **Modify approved QAPP as follows:** Revisions to Table 3.2-1 in Attachment E below. |

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| | and Rainfall | |
| **3.2.1** | If ice is found to be present in the cooler upon receipt, the laboratory will also note this on the COC form and may consider this an adequate indication that the cooler temperature is not above the acceptance criterion of 6°C | **Modify approved QAPP as follows:**<br>For samples that are delivered to the laboratory on the same day they are collected, if ice is found to be present in the cooler upon receipt, the laboratory will also note this on the COC form and may consider this an adequate indication that the cooler temperature is not above the acceptance criterion of 6°C |
| **3.2.3.1.** | **Table 3.2-4**. Summary of Calibration and QC Procedures for Method 200.7 | **Modify approved QAPP as follows:**<br>Revisions to Table 3.2-4 as shown in Attachment F below |
| **3.2.3.2** | **Table 3.2-5.** Summary of Calibration and QC Procedures for Method SW6010B | **Modify approved QAPP as follows:**<br>Revisions to Table 3.2-5 as shown in Attachment G below |
| **3.2.3.3.** | Method SW1640 – Determination of Trace Metals in Water by Preconcentration and ICP-MS | **Modify approved QAPP as follows:**<br>Method SW1638 & SW1640 – Determination of Trace Metals in Water by ~~Preconcentration and~~ ICP-MS<br>Replace original section text and add Table 3.2-6 'Summary of calibration and QC Procedures for Method SW1638/1640' as shown in Attachment H below |
| **3.2.3.4** | **Table 3.2-6**. Summary of Calibration and QC Procedures for Method SM 3500-Cr B | **Modify approved QAPP as follows:**<br>Re-number Table 3.2-~~6~~7 and revise MS/MSD corrective action as shown on Attachment I below |
| **3.2.3.5** | **Table 3.2-7**. Summary of Calibration and QC Procedures for EPA Method 245.1 | **Modify approved QAPP as follows:**<br>Re-number Table 3.2-~~7~~8 and revise as shown on Attachment J below |

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| **3.2.3.6** | Method QC includes a method blank, an LCS, and matrix spikes along with the use of internal standards. MDLs are listed in Tables 3.2-1, 3.2-2, and 3.2-3. | **Modify approved QAPP as follows:**<br>Method QC includes a method blank, an LCS, and matrix spikes along with the use of internal standards. MDLs are listed in Tables 3.2-1, 3.2-2, and 3.2-3. For samples where high chloride and low fluoride concentrations are anticipated, fluoride will need to be analyzed using an alternative EPA approved method such as SM 4500 F C, an ion-selective electrode method, to achieve the project MDL DQOs." |
| **3.2.3.6** | **Table 3.2-8.** Summary of Calibration and QC Procedures for EPA Method 300.0 | **Modify approved QAPP as follows:**<br>Re-number Table 3.2-~~8~~9 and revise as shown on Attachment K below |
| **3.2.3.9** | The MDL for this method is listed in Table 3.2-1. | **Modify approved QAPP as follows**:<br>The MDL for this method is listed in Table 3.2-1. To meet project MDL DQOs, sulfide may need to be analyzed using an alternative EPA approved method such as SM4500 S2 F, or a methylene blue colorimetric method. |
| **3.2.3.18** | **Table 3.2-9**. Summary of Calibration and QC Procedures for EPA Method 440.0 | **Modify approved QAPP as follows:**<br>Re-number Table 3.2-~~9~~10 and revise as shown on Attachment L below |
| **3.3.2** | The data qualifier code "V" applies to samples meeting these criteria. Corrective action will be performed to eliminate the source of contamination prior to proceeding with the analysis of these samples. After the source has been identified and corrected, all samples in the analytical batch will be re-extracted/re-digested and re-analyzed. | **Modify approved QAPP as follows:**<br>~~The data qualifier code "V" applies to samples meeting these criteria.~~ Corrective action will be performed to eliminate the source of contamination prior to proceeding with the analysis of these samples. After the source has been identified and corrected, all samples in the analytical batch will be re-extracted/re-digested and re-analyzed. If blank contamination is present in the reanalysis batch, associated sample results less than |

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| | | 10 times the blank concentration will be qualified using the code "V". |
| **3.3.7** | The MS will be spiked at a level less than or equal to the midpoint of the calibration curve for each analyte. Spike levels are only considered appropriate for assessing accuracy if they are less than four times the native sample concentration. | **Modify approved QAPP as follows:**<br>The MS will be spiked ~~at a level less than or equal to the midpoint of the calibration curve~~ within the calibration range of the method for each analyte. However, method requirement of ICV and CCV near midpoint of curve must be maintained. All matrix spikes will be fortified with the analyte of interest at an appropriate level respective to expected sample concentration (0.5 to 25 times the target analyte concentration). Automatic laboratory reanalysis is required for all unacceptable matrix spikes (and spikes not in the specified spike to sample ratio) in accordance with the process defined in Section 24.6.3 of the contract laboratory QA Manual and as specified in Standard Methods. Spike levels are only considered appropriate for assessing accuracy if they are ~~less than four times~~ greater than 30% of the native sample concentration. |
| **3.3.11** | Method Detection Limit (MDL) and Reporting Limit (RL) | **Modify approved QAPP as follows:**<br>Section title is modified as follows: Method Detection Limit (MDL) and Practical Quantitation Limits (PQLs)~~Reporting Limit (RL)~~<br>References to 'Reporting Limit' and 'RL' are replaced with 'Practical Quantitation Limit' and 'PQL' in the section |
| **3.3.11** | MDLs are determined at least yearly. Results from the annual studies are used to verify the MDL levels following procedures outlined in SOP-QA-013, Standard Operating Procedures for Performing MDL Studies. | **Modify approved QAPP as follows:**<br>~~MDLs are determined at least yearly.~~ MDL studies will be analyzed per 2009 TNI Standard: EL-V1M4 Section 1.5.2.1 which states the MDL shall be verified on an annual basis. However, NELAC standards reference must be used until TNI is promulgated in Florida. Results from the annual studies are used to verify the MDL levels… |

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| **Section 4** | | |
| 4.1.1.1 | Automated Data Processing Tool (ADaPT) Field Electronic Data Deliverable (EDD) Requirements<br><br>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 | **Modify approved QAPP as follows:**<br>Remove this heading and paragraph |
| 4.1.1.3 | 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. | **Modify approved QAPP as follows:**<br><br>During Pre-uprate monitoring, d~~D~~ata from each automated station ~~will be~~ was collected at 15-minute intervals from the top of each hour. The frequency of data collection is reduced to hourly during the post-uprate monitoring period. ~~That data will then be~~ Data is uploaded to the project database daily via telemetry or stored on-site and uploaded to the database at appropriate intervals. |
| 4.1.1.3. | 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. | **Modify approved QAPP as follows:**<br><br>Acoustical Doppler current meters will be used to measure velocity (i.e., flow) remotely located throughout the CCS. During the pre-uprate monitoring period, data ~~collected~~ from the current meters was ~~will be~~ collected at 15 minute intervals and electronically uploaded daily whenever possible. The requirement for Acoustical Doppler current meters was dropped from the 2013 post-uprate Monitoring Plan as |

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<table>
<tr><th>Section</th><th>Approved QAPP Dec 2011</th><th>Agencies Recommendations</th></tr>
<tr><td></td><td></td><td>these data were not needed under the approved water/salt budget methodology.</td></tr>
<tr><td>4.1.1.3</td><td>Table 4.1-2 Telemetry Data Qualifiers in the Project Database</td><td>Modify approved QAPP as follows:<br><table><tr><td>~~J~~E</td><td>Estimated</td><td>Designated estimated data. “~~J~~<u>E</u>” tags are converted to “M” codes when data cannot be reasonably estimated.</td></tr></table></td></tr>
<tr><td>4.1.1.3</td><td>Table 4.1-2 Telemetry Data Qualifiers in the Project Database</td><td>Modify approved QAPP as follows:<br><table><tr><td>?</td><td>~~Reject~~ Questionable (~~questionable~~ do not use)</td><td>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.</td></tr></table></td></tr>
<tr><td>4.1.3</td><td>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.</td><td>Modify approved QAPP as follows:<br><br>The laboratory reporting requirements are detailed in the Sections 4.1.<u>3</u>.1.and the laboratory data review requirements are in Section 4.1.<u>3</u>.2, below.</td></tr>
<tr><td>4.1.3</td><td>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.</td><td>Modify approved QAPP as follows:<br><br>~~For FDEP purposes, a~~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.</td></tr>
<tr><td>4.1.3.1</td><td>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</td><td>Modify approved QAPP as follows:<br><br>The case narrative will also include identification of all instances in which QC measure results failed to meet acceptance criteria ~~along with a brief,~~</td></tr>
</table>

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| | limit, and the value for the QC measure that was outside of acceptance limits. | ~~but complete, description of the QC measure involved, the acceptance limit, and the value for the QC measure that was outside of acceptance limits~~. The case narrative will include a discussion of any issue affecting sample integrity upon receipt of the samples at the laboratory. This shall include (but is not limited to) sample volumes not consistent with the volume markings on bottles (see 2.6.6.1), samples not at required temperature and/or samples not properly preserved. |
| 4.1.3.1 | Required Reportable Data<br>▪ MDL/RL data; | **Modify approved QAPP as follows:**<br>• MDL/~~RL~~PQL data; |
| 4.1.3.1 | **Electronic Data Deliverable (EDD)**:<br>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;… | **Modify approved QAPP as follows:**<br>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.~~ the data will be provided in two electronic forms; an MS Excel spreadsheet and an ADaPT file. The Excel file shall use the format generated by the lab and shall include all analytes, analyses, and analytical results. All results shall be reported to three digits but only two may be significant. ~~This includes~~The ADaPT EDD shall include three text files…. |
| 4.1.3.1 | **Sample Receipt, Preparation, and Analysis**:<br>This shall include the state of custody seals, container temperatures, sample bottle integrity, and sample preservation (if applicable). | **Modify approved QAPP as follows:**<br>Add after the sentence: The laboratory shall record all temperatures measured for each cooler. The laboratory shall also record any inconsistencies with sample volumes as received compared to sample volumes marked in the field (Section 2.6.6.1). |
| 4.1.3.1 | **Test Reports for Environmental Samples and Field QC Samples**<br>▪ MDL and RL information (adjusted for dilutions if necessary); and | **Modify approved QAPP as follows:**<br>▪ MDL and ~~RL~~PQL information (adjusted for dilutions if necessary); and |
| 4.1.3.1 | …results between the MDL and the RL will be flagged to indicate… | **Modify approved QAPP as follows:** |

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| | | …results between the MDL and the ~~RL~~PQL will be flagged to indicate… |
| 4.1.3.1 | **Matrix Spike/Matrix Spike Duplicate (MS/MSD) Data**<br>…a brief description of measures taken by the lab in attempt to alleviate the interference. | **Modify approved QAPP as follows:**<br><br>…a brief description of measures taken by the lab in attempt to alleviate the interference. A non-project sample should only be used for the MS/MSD analysis in the case where the client does not send sufficient volume for analysis. When either, or both, MS/MSD recover and precision are out of control, the case narrative will address all instances the results failed to meet acceptance criteria. All recoveries are listed within the recovery pages of the report. |
| 4.1.3.1 | **Method Detection Limits (MDLs) and Reporting Limits (RLs)** | **Modify approved QAPP as follows:**<br><br>**Method Detection Limits (MDLs) and ~~Reporting Limits (RLs)~~ Practical Quantitation Limits (PQL)**<br>(note two changes from RL to PQL within the subject section) |
| 4.1.3.1 | 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… | **Modify approved QAPP as follows:**<br><br>~~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.~~ All ADaPT EDDs shall be reviewed by the ADaPT EDD Error Checker to ensure completeness and that no critical errors exist prior to submission. All measurements are subject to uncertainty and a measured value is only complete if it is accompanied by a statement of the associated uncertainty. In accordance with Section 5.5.10 of the NELAC standards, the reporting of estimated uncertainty will be included with all analytical measurements. Sample results should be reported with analytical uncertainty measurements by including the value in the "error" column of the ADaPT file). |
| 4.2.2 | The instruments will be verified on a bi-monthly schedule. | **Modify approved QAPP as follows:**<br><br>The instruments will be verified on an approximate bi-monthly schedule. |

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| 4.2.2 | If the probe reading fails the continuing calibration verification, the previous data will be qualified as estimated (J). | **Modify approved QAPP as follows:**<br><br>If the probe reading fails the continuing calibration verification, the previous data will be qualified as estimated (~~J~~E) or questionable (?) if the data is clearly off. |
| 4.2.2 | If the difference is greater than 0.5ºC, the data will typically be qualified as estimated. | **Modify approved QAPP as follows:**<br><br>If the difference is greater than 0.5ºC, the data will typically be qualified as estimated (E) or questionable (?) if the data is clearly outside normal ranges. |
| 4.2.2 | …the incoming data shall be reviewed once a month with a more detailed assessment following verification/calibration events. | **Modify approved QAPP as follows:**<br><br>…the incoming data shall be reviewed typically once a month with a more detailed assessment following verification/calibration events. |
| 4.2.2 | ….whenever possible, for the period-of-interest of the data being analyzed. | **Modify approved QAPP as follows:**<br><br>…whenever possible, for the period-of-interest of the data being analyzed. All automated data required under the monitoring plan to be uploaded to the FPL database shall undergo an electronic review consisting of a comparison to expected ranges based on historic data and seasonal considerations and refined as more data becomes available. |
| 4.2.2 | 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. | **Modify approved QAPP as follows:**<br><br>~~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.~~ |

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| 4.2.2 | Availability guidelines for the automated equipment state instruments shall be repaired or replaced within 72 hours to maintain the acquisition of data. | **Modify approved QAPP as follows:**<br><br>Availability guidelines for the automated equipment state instruments shall be repaired or replaced within 72 hours to maintain the acquisition of data. This guideline cannot always be met given the size of the network and other logistical factors, however efforts will be conducted to repair or replace errant equipment within 7 days in order to maintain a robust data set. |
| 4.2.2.1 | Data will be reviewed monthly for drift and anomalies and summarized in semi-annual and annual reports. | **Modify approved QAPP as follows:**<br><br>Data will be reviewed as frequently as monthly for drift and anomalies when sufficient data are available and summarized in semi-annual and annual reports. For data stations without functional telemetry, data will be reviewed after data is downloaded in the field. |
| 4.2.2.2 | This raw automated data will be reviewed after the end of each month and, following validation/qualification, will be posted… | **Modify approved QAPP as follows:**<br><br>This raw automated data will be reviewed after each cleaning and calibration event (~60 days) ~~the end of each month~~ and, following validation/qualification, will be posted… |
| 4.2.3 | - Preparation and analysis logs;<br>- Tuning results;<br>- Internal standard results; and<br>- Laboratory studies (such as MDLs and correction factors).<br><br>A Tier 3 assessment shall be performed on all NELAC laboratory analytical data submitted for the project. | **Modify approved QAPP as follows:**<br><br>- Preparation and analysis logs and;<br>~~- Tuning results;~~<br>~~- Internal standard results; and~~<br>- Laboratory studies (such as MDLs and correction factors). |
| 4.2.3 | 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. | **Modify approved QAPP as follows:**<br><br>~~As the data will not be verified by ADaPT, a~~ A Tier 2 ~~3~~ review shall be performed on 100% of the non-standard method data packages. |
| 4.2.3.1 | The laboratory established quality control criteria shall be used to review data for accuracy and precision. The | **Modify approved QAPP as follows:** |

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| | laboratory may use the criteria stated in the specific method of analysis. | The ~~laboratory~~QAPP 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 if the criteria is not specified in the QAPP. |
| 4.2.3.1 | 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. | **Modify approved QAPP as follows:**<br><br>The laboratory may also establish acceptance criteria for parameters when they are not sufficiently detailed in the QAPP or the methods. When laboratory limits are established in lieu of specified QAPP criteria, they shall be used for data review and validation. |
| 4.2.3.1 | 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.<br><br>**Table 4.2-3. Laboratory QA Objectives for Non-Standard Methods / Aqueous Samples…**<br><br>**Table 4.2-4. Laboratory QA Objectives for Non-Standard Methods / Biota Samples….** | **Modify approved QAPP as follows:**<br>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.<br><br>**Delete Tables 4.2-3 and 4.2-4 in section 4.** |
| 4.2.3.1 | Table 4.2-5 below present the data…<br><br>**Table 4.2-5. Data Validation Qualifier Codes** | **Modify approved QAPP as follows:**<br><br>Table 4.2-~~35~~ below present the data…<br><br>**Table 4.2-~~35~~. Data Validation Qualifier Codes** |

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| 4.2.3.1 | 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…. | **Modify approved QAPP as follows:**<br><br>If the holding time is ~~grossly~~ exceeded for ~~mercury~~ any analyte ~~(more than two times the holding time limit)~~ the data will be qualified with a "Q" and the reviewer… |
| 4.2.3.1 | No existing text | **Modify approved QAPP as follows:**<br><br>Add the following section after 'Initial Calibration (IC)' section:<br>**Standard Reference Material (SRM):**<br>A SRM will be analyzed by the contract laboratory on an annual basis for parameters identified on Table 4.2-4. The results will be reported and discussed in the associated Data Usability Summary and incorporated in the subsequent semi-annual or annual report. The suggested standard reference material for cation and anion concentrations is IAPSO Seawater (Standard Seawater).<br><br>Add new **Table 4.2-4** as shown in Attachment M below |
| 4.2.3.1 | **Blanks:**<br><br>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. | **Modify approved QAPP as follows:**<br><br>~~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.~~ If analytes are detected in a preparation blank, the laboratory will follow the procedures outlined in Section 3.2. When applicable (at least one sample in the analytical batch is less than ten times the detected concentration in the blank) the lab will re-prepare and reanalyze the batch with the blank contamination. If the contamination persists, or if limited sample is available for re-preparation, or if no further steps are required in Section 3.2, the laboratory shall qualify all sample results less than 10 times the blank concentration with the "V" qualifier at the reported concentration. |

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| 4.2.3.1 | **Matrix Spike (MS) Analysis**<br><br>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. | **Modify approved QAAP as follows:**<br><br>~~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. |
| 4.2.3.1 | **Matrix Spike (MS) Analysis**<br><br>…the matrix spike recovery may not be an appropriate measure of accuracy. Data associated with matrix spike recoveries… | **Modify approved QAPP as follows:**<br><br>…the matrix spike recovery may not be an appropriate measure of accuracy. All matrix spikes will be fortified with the analyte of interest at an appropriate level respective to expected sample concentration (0.5 to 25 times the target analyte concentration). Automatic laboratory reanalysis is required for all unacceptable matrix spikes (and spikes not in the specified spike to sample ratio) in accordance with the process defined in Section 24.6.3 of the contract laboratory QA Manual and as specified in Standard Methods. Data associated with matrix spike recoveries… |
| 4.2.3.1 | **Matrix Spike (MS) Analysis**<br><br>• …for the MS/MSD will be qualified as estimated (“J”) whereas nondetect results will be considered to be acceptable for use without qualification.<br><br>• If the MS recovery for an analyte is less than the lower acceptance limit but >30%, suggesting a | **Modify approved QAPP as follows:**<br><br>• …for the MS/MSD will be qualified as estimated (“J~~+~~”) ~~whereas nondetect results will be considered to be acceptable for use without qualification~~.<br><br>• If the MS recovery for an analyte is less than the lower acceptance limit but >~~30~~10%, suggesting a potential low bias in reported results…<br><br>• If the MS recovery for an analyte is <~~30~~10%, positive sample results will be qualified… |

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| | potential low bias in reported results…<br>• If the MS recovery for an analyte is <30%, positive sample results will be qualified… | |
| 4.2.3.1 | **Matrix Spike (MS) Analysis**<br>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. | **Modify approved QAPP as follows:**<br>All samples of a similar matrix (e.g., freshwater versus saline matrix ) in the analytical batch will be qualified with a 'J' if both the MS and MSD do not meet acceptance criteria. ~~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.~~ |
| 4.2.3.1 | Review of CCS Tracer Suite Analysis Data<br>The Tier 3 QA elements for the CCS Tracer Suite isotope analysis include:<br>▪ Holding times;<br>▪ Mass spectrometer tuning and calibration;<br>▪ MDLs and units;<br>▪ Isobaric correction factors;<br>▪ Standard traceability;<br>▪ Post-analysis calculations/standardization; and<br>▪ Preparation/analysis batch information; | **Revise approved QAPP as follows:**<br>The ~~Tier 3~~ QA elements to be reviewed for the CCS Tracer Suite isotope analysis include:<br>▪ Holding times and preservations;<br>▪ ~~Mass spectrometer tuning and calibration;~~<br>▪ MDLs ~~and units~~($^{3}H$, $^{87}Sr/^{86}SR$);<br>▪ Uncertainty ($^{3}H$)~~Isobaric correction factors~~;<br>▪ Standard deviation ($^{2}H/^{1}H$, $^{18}O/^{16}O$, $^{13}C/^{12}C$);<br>▪ Standard traceability; |

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| | | ▪ ~~Post-analysis calculations/standardization; and~~<br><br>▪ Preparation/analysis batch information;<br><br>▪ Field and laboratory duplicate RPD; and<br><br>▪ Field blank contamination.<br><br>The evaluation of holding times, preservations, MDL's, and field and laboratory duplicates shall follow the procedures outlined above. Holding time and preservation requirements for the isotope analyses are listed in Section 2.6. Required MDL's are listed in Section 3.2. Field and laboratory duplicate precision will be evaluated for all isotope results as described above.<br><br>Field blank results for hydrogen, oxygen, and carbon isotope data are not applicable as results are reported as unitless ratios. Field blank results for strontium and tritium blank results are evaluated as described above.<br><br>Laboratory QC limits for non-standard methods are established by the respective laboratories doing the analyses and are specified in Appendix B. |
| 4.2.3.1 | Associated sample data will be qualified as estimated ("J") if:<br><br>• Holding times were not met;<br>• MS tunes and calibration fail one lab acceptance criteria;<br>• MDLs are reported above project stated MDLs; | Associated sample data will be qualified as estimated ("J") if:<br><br>• Holding times were not met;<br>• ~~MS tunes and calibration fail one lab acceptance criteria;~~<br>• MDLs are reported above project stated MDLs ($^{3}H$, $^{87}Sr/^{86}Sr$); |

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| | • Correction factor/standardization calculations cannot be verified by manual recalculation;<br>• Standards and reference material certifications are not provided; and<br>• Batches exceed those described in Section 3 and Appendix B. | • ~~Correction factor/standardization calculations cannot be verified by manual recalculation;~~<br>• Field blank contamination is greater than 10% of the sample concentrations ($^{3}H$, $^{87}Sr/^{86}Sr$ );<br>• Field duplicate RPD exceeds project objectives;<br>• Standards and reference material certifications are not provided; and<br>• Batches exceed those described in Section 3 and Appendix B.<br>In addition, for tritium, results with uncertainties greater than the results are reported as not detected and qualified with a "U". |
| 4.2.3.1 | Data Review of Other Analyses<br>▪ Total phosphorus ≥ Total dissolved phosphorus > Soluble reactive phosphorous;<br>▪ Total Kjeldahl nitrogen ≥ Total dissolved Kjeldahl nitrogen > Ammonia; and<br>▪ Nitrate + Nitrite ≥ Nitrite. | **Modify approved QAPP as follows:**<br>▪ Total phosphorus ≥ Total dissolved phosphorus > Soluble reactive phosphorous; and<br>▪ Total Kjeldahl nitrogen ≥ Total dissolved Kjeldahl nitrogen > Ammonia~~; and~~<br>▪ ~~Nitrate + Nitrite ≥ Nitrite.~~ |
| 4.2.3.2 | The "QC" column will include all associated QC performed on a particular specification of samples associated with the given QC sample. | **Modify approved QAPP as follows:**<br>The "QC" column will include all associated QC performed on a particular ~~specification of samples associated with the given QC~~ sample. |

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| 4.2.3.2 | ▪ MDL/RL/CRQL issues; | **Modify approved QAPP as follows:**<br><br>▪ MDL/~~RL~~PQL/CRQL issues; |
| 4.2.3.2 | Each reviewed test report will be initialed and dated by the person who performed the review. The appendices will also contain… | **Modify the approved QAPP as follows.**<br><br>~~Each reviewed test report will be initialed and dated by the person who performed the review.~~ The final version of each laboratory data package will be electronically signed on the front page before posting to the website. The appendices will also contain… |
| 4.3.1.3 | 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. | The calculation is done on a daily basis integrating the previous calendar day's 24-hours ~~(~~of 15-minute interval data~~)~~(hourly during the post-uprate monitoring period) and generated early (~ 4 a.m.) the following day. |

## June 2013 Revisions to the December 2011 Approved QAPP

| Section | Approved QAPP Dec 2011 | Agencies Recommendations |
|---|---|---|
| 4.3.1.4 | **Table 4.3-2. Report Submittal Summary**<br><br>Biscayne Bay Geophysical Survey - Electronically posted within 6 months of completion of survey<br><br>Comprehensive Pre-Uprate Report - "Electronically posted within 90 days of completion of sampling and analysis for each year" | **Modify approved QAPP as follows:**<br><br>Biscayne Bay Geophysical Survey - Electronically posted ~~within 6 months of completion of survey~~ upon submission of data/findings by USGS.<br><br>Comprehensive Pre-Uprate Report - Electronically posted ~~within 90 days of completion of sampling and analysis for each year~~ upon submission of the report to the Agencies. |
| **Section 5** | | |

## June 2013 Revisions to the December 2011 Approved QAPP

| Section | Approved QAPP Dec 2011 | Agencies Recommendations |
|---|---|---|
| 5.3 | Technical systems audits of field activities will be conducted at least once per year with an interval between audits of at least 6 months during the field operation. ….Table 5.3-1 details the checklist to be used during audits of field activities and/or documents, whether it requires an on-site inspection or if a review of the documentation is sufficient, and the frequency with which these audits are to be performed. These audits may be performed together or scheduled separately, but all shall be performed at least once per year. | **Modify approved QAPP as follows:**<br>Technical systems audits of field activities (ecological and water quality/hydrology audits) will be conducted ~~at least~~ once per calendar year by FPL and/or the District with an interval between audits of at least 6 months during the field operation.<br>…These audits may be performed together or scheduled separately, but all shall be performed ~~at least~~ once per year. |
| 5.3 | **Table 5.3-1. Field Technical Audit Checklists** | **Modify approved QAPP as follows:**<br>Change Frequency to "once per year". Delete "≥" in table. |
| **Section 6 and 7 (no modifications to the December 2011 approved QAPP)** | | |

## ATTACHMENT A

**Table 2.5-2. Field Instrument Calibration Summary**

| Parameter | Initial Calibration | Initial Calibration Verification (ICV) | Continuing Calibration Verification (CCV) |
|---|---|---|---|
| pH | - Use at least 2 standards: pH 7 and then pH 4 and/or 10.<br>- Standard choice other than pH 7 is dependent on station pH history.<br>- Conduct ~~within 24 hour period~~ daily prior to use for grab sample collection or if CCV fails. | - Read a standard as a sample.<br>- Must read within ± 0.2 standard pH units of calibration buffer TV. | - Read ~~at the end of each sampling day~~ daily, no later than 24 hrs after initial calibration or previous CCV.<br>- Read without pressing "Calibrate".<br>- Two buffers that bracket the sample value range. Preferably use the pH 7 and one other pH 4 or 10.<br>- Must read within ± 0.2 standard pH units of calibration buffer TV. |
| Specific Conductance | - Use 1 standard at the upper end of expected sample reading range but no less than 720 µS/cm.<br>- Conduct daily prior to use for grab sample collection or if CCV fails. | - Read ~~after~~ without pressing "Calibrate".<br>- ~~Up to 3 standards that bracket the sample range.~~ One (1) standard at the low end of the expected sample reading range but no less than 100 µm/cm<br>- Must be within ± 5% of TV | - Read ~~at the end of each sample day, or within~~ daily, no later than 24 hrs ~~of~~ after initial calibration ~~for grab sample collection~~ or previous CCV.<br>- Read ~~only~~ (do not press "calibrate").<br>- ~~One standard used to verify calibration~~ Two standards that bracket the sample value range. Must be within ± 5% of TV. |
| Temperature | | | - Monthly verification against NIST-traceable thermometer prior to collection and at the end of each sampling event.<br>- Must be within ± 0.5ºC of NIST traceable readings. |
| DO | - ~~Read~~ Calibrate under water - saturated atmosphere.<br>- Reading must be within ± 0.3 mg/L of expected soluble oxygen (in water saturated air) value at that water temperature.<br>- Performed daily | - Read under water - saturated atmosphere.<br>- Reading must be within ± 0.3 mg/L of expected soluble oxygen (in water saturated air) value at that water temperature. | - Read daily, no later than 24 hrs after initial calibration or previous CCV.<br>- Read under water saturated atmosphere.<br>- Reading must be within ± 0.3 mg/L of expected soluble oxygen (in water saturated air) value at that water temperature.<br>- ~~Do CCV at the end of the event, or within 24 hrs after initial calibration, whichever is less~~ |

**Table 2.5-2. Field Instrument Calibration Summary**

| Parameter | Initial Calibration | Initial Calibration Verification (ICV) | Continuing Calibration Verification (CCV) |
|---|---|---|---|
| ORP | - Within 24 hours, prior to use or if CCV fails.<br>- Verify meter response against redox standard. | - Must be within ± 20 mV of theoretical redox value. | |
| PAR (Light Extinction) | - Verify meter at zero irradiance.<br>- Meter must not read > 0 PAR.<br>- Sensors are calibrated by the manufacturer every two years. | | |
| Turbidity | - At least two primary standards used to calibrate, bracketing the expected sample range.<br>- Conduct at least quarterly or if CCV using secondary standards fails<br>- Verification of secondary standard is performed immediately after calibration with primary standards each quarter. | - One standard read as a sample for verification.<br>- Standard value = 0.1-10 NTU: the response must be within 10% of the standard.<br>11-40 NTU: 8%<br>41-100 NTU: 6.5%<br>>100 NTU: 5%<br>- Perform quarterly after calibration with primary standards. | -Two Secondary standards read as a sample for verification.<br>-The two standards must bracket the range of values read for the day.<br>-Performed daily prior to sample collection.<br>- Standard value ≤ 0.1 NTU: the response must be within 0.02 NTUs.<br>0.1-10 NTU: the response must be within 10% of the standard.<br>11-40 NTU: 8%<br>41-100 NTU: 6.5%<br>>100 NTU: 5% |

**ATTACHMENT B**

**Table 2.6-2. Categories of Analytes from Groundwater (GW) with or without Nutrients, Surface Water (SW), Cooling Canal Water (CCS), Porewater (PW), and Rainwater (RF).**

| Analyte | Monitoring Plan (Table 2-1) Label | GW* | SW* | CCS* | PW * | RF* |
|---|---|---|---|---|---|---|
| Metals, Total Recoverable | Elements | SA | - | - | ~~X~~ | - |
| Iron and Barium | Tracer | Q | Q | Q | Q | - |
| Chromium (VI) | Elements | SA | - | - | ~~X~~ | - |
| Mercury | Elements | SA | - | - | ~~X~~ | - |
| Anions ($Cl^-$, $SO_4^{2-}$, $F^-$, $Br^-$, $HCO_3^-$) | Ions | Q | Q | Q | ~~X~~Q | - |
| Cations ($Ca^{2+}$, $Na^+$, $Mg^{2+}$, $K^+$, $Sr^{2+}$, $B^+$) | Ions | Q | Q | Q | ~~X~~Q | - |
| Alkalinity | Ions | Q | Q | Q | ~~X~~Q | - |
| Ammonia as N | Nutrients | SA | SA | SA | ~~X~~SA | - |
| Unionized Ammonia - calculated | Nutrients | SA | SA | -SA | ~~X~~SA | - |
| Nitrate+Nitrite ($NO_X$) | Nutrients | SA | SA | SA | ~~X~~SA | - |
| ~~Nitrite (NO2N) as N~~ | ~~Nutrients~~ | ~~SA~~ | ~~SA~~ | ~~-~~ | ~~X~~ | |
| Total Kjeldahl Nitrogen | Nutrients | SA | SA | SA | ~~X~~SA | - |
| Total Nitrogen – calculated | Nutrients | SA | SA | -SA | ~~X~~SA | - |
| Total Phosphorus | Nutrients | SA | SA | SA | ~~X~~SA | - |
| Soluble Reactive Phosphorus | Nutrients | SA | SA | SA | ~~X~~SA | - |

**Table 2.6-2. Categories of Analytes from Groundwater (GW) with or without Nutrients, Surface Water (SW), Cooling Canal Water (CCS), Porewater (PW), and Rainwater (RF).**

| Analyte | Monitoring Plan (Table 2-1) Label | GW* | SW* | CCS* | PW * | RF* |
|---|---|---|---|---|---|---|
| Silica - Dissolved | Nutrients | - | - | SA | - | - |
| Sulfides | Ions | Q | Q | Q | ~~X~~Q | - |
| TDS | Other | Q | - | - | - | - |
| Dissolved Inorganic Carbon | Tracer | Q | Q | Q | ~~X~~Q | - |
| $^{3}H$ | Tracer | Q | Q | Q | ~~X~~Q | Q |
| $^{2}H/^{1}H$ | Tracer | Q | Q | Q | ~~X~~Q | - |
| $^{18}O/^{16}O$ | Tracer | Q | Q | Q | ~~X~~Q | - |
| $^{87}Sr/^{86}Sr$ | Tracer | Q | Q | Q | ~~X~~Q | - |
| $^{13}C/^{12}C$ | Tracer | Q | Q | Q | ~~X~~Q | - |
| Gross Alpha | Other | - | - | SA | - | - |

Note:
* ~~Porewater~~ Pre-uprate and interim monitoring period sampling frequency ~~varies depending on location~~ per October 2009 Monitoring Plan. ~~sections 2.8.6, 2.8.7 and 2.8.8~~. Post-uprate monitoring sampling frequency is described in the July 2013 Monitoring Plan.
Q = Quarterly sampling event
SA = Semiannual sampling event
1 = trace elements and mercury referred to by the lab as "trace metals". Barium and Iron actually part of trace metals but broken out separately since they are included with the tracer suite.

## ATTACHMENT C

### Table 2.6-3. Groundwater and Surface Water Sample Volumes, Container Types, Preservation and Holding Time Requirements

| Analyte | Analytical Method | Container | Preservation | Preferred Sample Volume* | Maximum Holding Time |
|---|---|---|---|---|---|
| Metals, Total Recoverable (Ba, Fe)[1] | EPA 200.7 | Plastic | $HNO_3$ to pH<2, or at least 24 hours prior to analysis | 250 mL | 180 Days |
| Metals, Total Recoverable (Mn, Mo) [1] | EPA 1638 | Plastic | $HNO_3$ to pH<2, or at least 24 hours prior to analysis | 250 mL | 180 Days |
| Metals, Total Recoverable (As,Be, Cd,Cu, Ni, Pb, Se, Tl, V, Zn) [1] | EPA 1640 | Plastic | $HNO_3$ to pH<2, or at least 24 hours prior to analysis | 250 mL | 180 Days |
| Chromium (VI) | SM 3500-Cr B | Plastic | ≤6°C, ~~NaOH to pH>9.3 - 9.71~~ | 500 mL | 24 Hours |
| Mercury | EPA 245.1 | Plastic | ≤6°C, $HNO_3$ to pH<2 | 250 mL | 28 Days |
| Common anions (Cl -, SO42-, F-, Br-, HCO3-) | EPA 300.0 | Plastic | ≤6°C | ~~500 mL~~ 250 mL | 28 days |
| Fluoride[3] | SM 4500 F C | Plastic | ≤6°C | 250 mL | 28 days |
| Cations (Ca2+, Na+, Mg2+, K+, Sr2+, B+) | EPA 6010B | Plastic | $HNO_3$ to pH<2 ~~or none if unfiltered~~ | 250 mL | 180 Days (48 hrs if not filtered / preserved) |
| Alkalinity | SM 2320 B | Plastic | ≤6°C | 250mL | 14 Days |
| Ammonia as N | SM 4500-NH3 G | Plastic | ≤6°C, $H_2SO_4$ to pH<2, 0.45 µm filtered [2] | 500 mL | 28 Days |
| Nitrate + Nitrite (NOx) | EPA 353 .2 | Plastic | ≤6°C, $H_2SO_4$ to pH<2, 0.45 µm filtered [2] | 250 mL | 28 Days |
| Total Kjeldahl Nitrogen | EPA 351.2 | Plastic | ≤6°C, H2SO4 to pH<2 | 250 mL | 28 Days |
| Total Phosphorus | EPA 365.1 | Plastic | ≤6°C, $H_2SO_4$ to pH<2 | 250 mL | 28 Days |

## Table 2.6-3. Groundwater and Surface Water Sample Volumes, Container Types, Preservation and Holding Time Requirements

| Analyte | Analytical Method | Container | Preservation | Preferred Sample Volume* | Maximum Holding Time |
|---|---|---|---|---|---|
| Soluble Reactive Phosphorus | SM 4500-P E | Plastic | ≤6°C, 0.45 µm filtered [2] | 125 mL | 48 hours |
| Silica | EPA 200.7 | Plastic | ≤6°C, 0.45 µm filtered [2] | 250 mL | 28 Days |
| Sulfides | SM 4500-S2 F | Plastic | ≤6°C, NaOH to pH>9, 2 mL zinc acetate | 500 mL | 7 Days |
| Sulfides[3] | EPA 376.2 | Plastic | ≤6°C, NaOH to pH>9, 2 mL zinc acetate | 500 mL | 7 Days |
| TDS | SM 2540 C | Plastic | ≤6°C | 500 mL | 7 Days |
| Dissolved Inorganic Carbon | EPA 9060A | Glass | ≤6°C, HCl to pH<2, 0.45 µm filtered [4] | 80 mL | 28 Days |
| Dissolved Carbon | EPA 9060A | Glass | ≤6°C, 0.45 µm filtered [2] | 80 mL | 28 Days |
| **Isotope / Radiological Analyses** | | | | | |
| $^{3}H$ | EE-LSC[5] | Plastic | N/A | 125 mL | 1 Year |
| $^{2}H/^{1}H$ | IRMS[6] | Glass | N/A | 40 mL | 270 Days |
| $^{18}O/^{16}O$ | IRMS[6] | Glass | N/A | 40 mL | 270 Days |
| $^{87}Sr/^{86}Sr$ | TIMS [7] | Plastic | 0.45µm filtered [2] ~~HNO3 to pH<2~~ | 125 mL | 1 Year |
| $^{13}C/^{12}C$ | IRMS[6] | Plastic | 0.45µm filtered[2], 5±2°C | 125 mL | 180 Days |
| Gross Alpha | EPA 900.0 | Plastic | $HNO_3$ to pH<2 | 1000 mL | 180 Days |

Notes:

* Bottle size provided may be larger than listed as a preferred volume.
[1] Metals performed b 200.7. Methods 1638 and 1640 are method alternatives for trace elements listed.
[2] Filtered in the field.
[3] Alternative method for analyte listed.
[4] Preserved by laboratory
[5] EE-LSC: Electrical Enrichment followed by Liquid Scintillation Counting.
[6] IRMS: Isotope Ratio Mass Spectrometer.
[7] TIMS: Thermal Ionization Mass Spectrometer.

## ATTACHMENT D

### Table 2.6-6. Porewater Sample Volumes, Container Types, Preservation, and Holding Time Requirements

| Analyte | Analytical Method | Container | Preservation | Minimum Sample Volume | Maximum Holding Time |
|---|---|---|---|---|---|
| **Isotopes** | | | | | |
| $^{3}H$ | EE-LSC [2] | Plastic | N/A | 50 mL | 1 Year |
| $^{2}H/^{1}H$ | IRMS [3] | ~~Plastic~~ Glass | ~~5 ± 2°C~~ N/A | ~~50~~20 mL | 270 Days |
| $^{18}O/^{16}O$ | IRMS [3] | | | | |
| $^{87}Sr/^{86}Sr$ | TIMS [4] | Plastic | 0.45µm filtered[1], ~~HNO3 to pH<2~~ | 50 mL | 1 Year |
| $^{13}C/^{12}C$ | IRMS [3] | Plastic | 0.45µm filtered[1], ~~5~~4±2°C, ~~1mL $Hg_2Cl_2$~~ | 50 mL | 180 Days |
| **Ions** | | | | | |
| Metals, Total Recoverable (Fe, Ba) | EPA 200.7 | Plastic | $HNO_3$ to pH<2, ~~(at least 24 hours prior to analysis)~~ | 50 mL | 180 Days |
| Common anions ($Cl^-$, $SO_4^{2-}$, ~~$F^-$,~~ $Br^-$, $HCO_3^-$) | EPA 300.0 | Plastic | 4 ± 2°C ~~≤6°C~~ | 150 mL | ~~28~~14 Days |
| Fluoride | SM 4500 FC | Plastic | 4 ± 2°C | 150 mL | 14 Days |
| Alkalinity | SM 2320 B | Plastic | 4 ± 2°C ~~≤6°C~~ | ~~100~~150 mL | 14 Days |
| Cations ($Ca^{2+}$, $Na^+$, $Mg^{2+}$, $K^+$, $Sr^{2+}$, $B^+$) | EPA 6010B | Plastic | HNO3 to pH<2 ~~or none if unfiltered~~ | 50 mL | 180 Days (48 hrs if not filtered / preserved) |
| Sulfides | SM 4500-$S_2$ F EPA 376.2 | Plastic | 4 ± 2°C ~~≤6°C~~, NaOH to pH>9, 2 mL zinc acetate | 250 mL | 7 Days |
| **Nutrients** | | | | | |
| Total Phosphorus (TP) | EPA 365.5 | Plastic | 4 ± 2°C ~~≤6°C~~, $H_2SO_4$ to pH<2 | 50 mL | 28 Days |
| Nitrate+Nitrite ($NO_x$) | EPA 353.2 | Plastic | 4 ± 2°C ~~≤6°C~~, $H_2SO_4$ to pH<2, 0.45µm filtered[1] | 25 ~~50~~ mL | 28 Days |
| Nitrite (NO2N) as N | EPA 353.2 | Plastic | 4 ± 2C ~~≤6°C~~, 0.45µm filtered1 | 125 mL[5] | 48 hours |
| Soluble Reactive Phosphorus (SRP) | SM 4500-P-E | Plastic | 4 ± 2°C ~~≤6°C~~, 0.45µm filtered[1] | 80 ~~50~~ mL | 48 hours |
| Ammonia as N | SM 4500 NH3 G | Plastic | 4 ± 2°C ~~≤6°C~~, $H_2SO_4$ to pH<2, 0.45 µm filtered[1] | 80 ~~50~~ mL | 28 Days |
| ~~Unionized Ammonia as N – calculated[5]~~ | ~~FDEP SOP NH3~~ | — | — | — | — |

## Table 2.6-6. Porewater Sample Volumes, Container Types, Preservation, and Holding Time Requirements

| Analyte | Analytical Method | Container | Preservation | Minimum Sample Volume | Maximum Holding Time |
|---|---|---|---|---|---|
| Total Kjeldahl Nitrogen (TKN) | EPA 351.2 | Plastic | 4 ± 2°C ~~≤6°C~~, $H_2SO_4$ to pH<2 | 50 mL | 28 Days |
| Dissolved Organic Carbon | EPA 9060A | Glass | 4 ± 2°C ~~≤6°C~~, HCl to pH<2, 0.45µm filtered[1] | 80 ~~250~~ mL | 28 days |
| Dissolved Carbon | EPA 9060A | Glass | 4 ± 2°C ~~≤6°C~~, 0.45µm filtered[1] | 80 ~~40~~ mL | 28 days |

Notes:

[1] Filtered in the field
[2] EE-LSC: Electrical Enrichment followed by Liquid Scintillation Counting.
[3] IRMS: Isotope Ratio Mass Spectrometer.
[4] TIMS: Thermal Ionization Mass Spectrometer.
[5] Assuming analysis of this sample is conducted for nitrite only

## ATTACHMENT E

**Table 3.2-1. Analytical Methods and Default QA/QC Targets for Groundwater, Surface Water, Porewater, and Rainfall**

| Method | Matrix | Analyte | Units | Surface Water Standards[1] | | Groundwater Standards | | Drinking Water Standards | | Project Required MDL[6] | Exp. Conc. Range |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Fresh Water (Class III) | Marine (Class III) | GW (G-1)[2] | CTLs[3] | MCL[4] | Secondary[5] | | |
| **IONS** | | | | | | | | | | | |
| EPA 6010B | SW, GW | Calcium ($Ca^{2+}$) | mg/L | -- | -- | -- | -- | -- | -- | 0.17 | >20x |
| EPA 6010B | SW, GW | Sodium ($Na^{+}$) | mg/L | -- | -- | 160 | primary | 160 | -- | ~~0.2~~ 1.0 | N/A |
| EPA 6010B | SW, GW | Magnesium ($Mg^{2+}$) | mg/L | -- | -- | -- | -- | -- | -- | 0.1 | >20x |
| EPA 6010B | SW, GW | Potassium ($K^{+}$) | mg/L | -- | -- | -- | -- | -- | -- | 0.33 | >20x |
| EPA 6010B | SW, GW | Strontium ($Sr^{2+}$) | mg/L | -- | -- | -- | 4.2 | -- | -- | ~~0.0005~~ 0.1 | <20x |
| EPA 6010B | SW, GW | Boron ($B^{+}$) | mg/L | -- | -- | -- | 1.4 | -- | -- | 0.05 | N/A |
| EPA 300.0 | SW, GW | Chloride ($Cl^{-}$) | mg/L | -- | ≤ 10% [8] | 500 [7] | secondary | -- | 250 | 0.5 | >>20x |
| EPA 300.0 | SW, GW | Bromide ($Br^{-}$) | mg/L | -- | -- | -- | -- | -- | -- | ~~0.05~~ 0.5 | N/A |
| EPA 300.0 | SW, GW | Sulfate ($SO_4^{2-}$) | mg/L | -- | -- | -- | -- | -- | 250 | 0.5 | >20x |
| EPA 300.0 / SM4500 FC | SW, GW | Fluoride ($F^{-}$) | mg/L | ≤ 10 | ≤ 5 | 1.4 as F | secondary | 4 | 2 | 0.05 | <20x |
| SM2320B | SW, GW | Alkalinity as $CaCO_3$ | mg/L | ~~>~~≤ 20 | -- | -- | -- | -- | -- | 1.0 | N/A |
| SM2320B | SW, GW | Bicarbonate ($HCO_3^{-}$) | mg/L | -- | -- | -- | -- | -- | -- | 1.0 | N/A |
| SM 4500S2 F / 376.2 | SW, GW | Sulfides | mg/L | -- | -- | 0.2 | -- | -- | -- | **0.2** | N/A |

**Table 3.2-1. Analytical Methods and Default QA/QC Targets for Groundwater, Surface Water, Porewater, and Rainfall**

| Method | Matrix | Analyte | Units | Surface Water Standards[1] | | Groundwater Standards | | Drinking Water Standards | | Project Required MDL[6] | Exp. Conc. Range |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Fresh Water (Class III) | Marine (Class III) | GW (G-1)[2] | CTLs[3] | MCL[4] | Secondary[5] | | |
| **NUTRIENTS** | | | | | | | | | | | |
| SM 4500 $NH_3$ G | SW, GW, PW | Ammonia (as N) | mgN/L | -- | -- | 0.5 | 2.8 | -- | -- | 0.05 | <20x |
| DEP SOP ($NH_3$) | SW, GW, PW | Unionized Ammonia - calculated | mg /L | ≤ 0.02 | -- | -- | -- | -- | -- | not applicable[16] | |
| DEP SOP ($NH_3$) | SW, GW, PW | Ammonium - calculated | mg /L | -- | -- | -- | -- | -- | -- | not applicable[16] | N/A |
| EPA 353.2 | SW, GW, PW | Nitrate+Nitrite ($NO_x$) | mg/L | -- | -- | 10 | primary | 10 | -- | ~~0.01~~ 1.0 | >20x |
| ~~EPA 353.2~~ | ~~SW, GW, PW~~ | ~~Nitrite ($NO_2$)~~ | ~~mg/L~~ | ~~--~~ | ~~--~~ | ~~1~~ | ~~primary~~ | ~~1~~ | ~~--~~ | ~~0.01~~ | ~~>20x~~ |
| ~~EPA 353.2~~ | ~~SW, GW, PW~~ | ~~Nitrate - calculated~~ | ~~mg/L~~ | ~~--~~ | ~~--~~ | ~~10~~ | ~~primary~~ | ~~10~~ | ~~--~~ | ~~0.01~~ | |
| EPA 351.2 | SW, GW, PW | Total Kjeldahl Nitrogen | mg/L | -- | -- | -- | -- | -- | -- | 0.2 | >20x |
| EPA 353.2 & EPA 351.2 | SW, GW, PW | Total Nitrogen (TN) – calculated | mg/L | -- | -- | -- | -- | -- | -- | not applicable[16] | >20x |
| EPA 365.1 | SW, GW, PW | Total Phosphorous (TP) | mg/L | -- | -- | -- | -- | -- | -- | 0.005 | >20x |

**Table 3.2-1. Analytical Methods and Default QA/QC Targets for Groundwater, Surface Water, Porewater, and Rainfall**

| Method | Matrix | Analyte | Units | Surface Water Standards[1] | | Groundwater Standards | | Drinking Water Standards | | Project Required MDL[6] | Exp. Conc. Range |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Fresh Water (Class III) | Marine (Class III) | GW (G-1)[2] | CTLs[3] | MCL[4] | Secondary[5] | | |
| SM-4500 P-E | SW, GW, PW | Soluble Reactive Phosphorous (SRP) | mg/L | -- | -- | -- | -- | -- | -- | ~~0.002~~ 0.05 | N/A |
| EPA 200.7 | SW, PW | Silica | mg/L | -- | -- | -- | -- | -- | -- | 0.5 | N/A |
| **TRACE ELEMENTS** | | | | | | | | | | | |
| EPA 200.7 / 1640 | GW | Arsenic | mg/L | ≤ 0.05 | ≤ 0.05 | 0.01 | -- | 0.01 | -- | 0.002 | >20x |
| EPA 200.7 | GW | Barium | mg/L | -- | -- | 2 | primary | 2 | -- | 0.005 | N/A |
| EPA 200.7 / 1640 | GW | Beryllium | mg/L | ≤ 0.00013 [9] | ≤ 0.00013 [9] | 0.004 | primary | 0.004 | -- | 0.00015 | N/A |
| EPA 200.7/ 1640 | GW | Cadmium | mg/L | Cadmium[10] | < 0.0088 | 0.005 | primary | 0.005 | -- | 0.0002 | <20x |
| EPA 200.7/ 1640 | GW | Copper | mg/L | Copper[13] | ≤ 0.0037 | -- | secondary | -- | 1 | 0.002 | <20x |
| EPA 200.7 | GW | Iron | mg/L | ≤ 1.0 | ≤ 0.3 | 0.3 | secondary | -- | 0.3 | 0.044 | <20x |
| EPA 200.7/ 1640 | GW | Lead | mg/L | Lead[14] | ≤ 0.0085 | 0.015 | primary | 0.0015 | | 0.001 | <20x |
| EPA 200.7/ 1638 | GW | Manganese | mg/L | -- | -- | -- | secondary | -- | 0.05 | 0.005 | N/A |
| EPA 200.7 / 1638 | GW | Molybdenum | mg/L | -- | -- | -- | 0.035 | -- | -- | 0.005 | N/A |
| EPA 200.7/ 1640 | GW | Nickel | mg/L | Nickel[11] | ≤ 0.0083 | 0.1 | primary | 0.1 | -- | 0.005 | N/A |
| EPA 200.7/ 1640 | GW | Selenium | mg/L | ≤ 0.005 | ≤ 0.071 | 0.05 | primary | 0.05 | -- | 0.002 | N/A |
| EPA 200.7/ 1640 | GW | Thallium | mg/L | < 0.0063 | < 0.0063 | 0.002 | primary | 0.002 | -- | 0.001 | N/A |
| EPA 200.7/ | GW | Vanadium | mg/L | -- | -- | -- | 0.049 | -- | -- | 0.01 | N/A |

**Table 3.2-1. Analytical Methods and Default QA/QC Targets for Groundwater, Surface Water, Porewater, and Rainfall**

| Method | Matrix | Analyte | Units | Surface Water Standards[1] | | Groundwater Standards | | Drinking Water Standards | | Project Required MDL[6] | Exp. Conc. Range |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Fresh Water (Class III) | Marine (Class III) | GW (G-1)[2] | CTLs[3] | MCL[4] | Secondary[5] | | |
| 1640 | | | | | | | | | | | |
| EPA 200.7/ 1640 | GW | Zinc | mg/L | Zinc[15] | ≤ 0.086 | -- | secondary | -- | 5 | 0.02 | <20x |
| SM-3500 CR-B | GW | Chromium (CrVI) | mg/L | ≤ 0.011 | ≤ 0.05 | -- | primary | 0.1 (total) | -- | ~~0.002~~ 0.01 | N/A |
| EPA 245.1 | GW | Mercury | mg/L | 0.000012 | 0.000025 | -- | primary | 0.002 | -- | 0.0001 | N/A |
| **CCS TRACER SUITE - ISOTOPES** | | | | | | | | | | | |
| See Appendix B | GW, SW, PW | Hydrogen ($_2$H) [Deuterium] | ‰ | -- | -- | -- | -- | -- | -- | -- | N/A |
| See Appendix B | SW, GW, RW, PW | Hydrogen ($^3$H) [Tritium] | pCi/L | -- | -- | -- | -- | 20,000 | -- | 10 | N/A |
| See Appendix B | SW, GW, PW | Oxygen ($^{18}$0, $^{16}$0) | ‰ | -- | -- | -- | -- | -- | -- | -- | N/A |
| See Appendix B | GW, SW, PW | Strontium ($^{87}$Sr, $^{86}$Sr) | ‰ | -- | -- | -- | -- | -- | -- | -- | N/A |
| See Appendix B | GW, SW, PW | Carbon ($_{13}$C,$_{12}$C) | ‰ | -- | -- | -- | -- | -- | -- | -- | N/A |
| **OTHER PARAMETERS** | | | | | | | | | | | |

**Table 3.2-1. Analytical Methods and Default QA/QC Targets for Groundwater, Surface Water, Porewater, and Rainfall**

| Method | Matrix | Analyte | Units | Surface Water Standards[1] | | Groundwater Standards | | Drinking Water Standards | | Project Required MDL[6] | Exp. Conc. Range |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Fresh Water (Class III) | Marine (Class III) | GW (G-1)[2] | CTLs[3] | MCL[4] | Secondary[5] | | |
| EPA 900.0[12] | SW (CCS) | Gross Alpha | pCi/L | ≤15 | ≤15 | -- | -- | ≤15 | -- | 3 | N/A |
| ~~EPA 9060A~~ | | ~~Dissolved Carbon (DC)~~ | | | | | | | | | |
| EPA 9060A | SW, GW, PW | Dissolved Inorganic Carbon (DIC) - calculated | mg/L | -- | -- | -- | -- | -- | -- | Not Applicable[16] | N/A |
| SM 2540 C | GW | Total Dissolved Solids (TDS) | mg/L | -- | -- | -- | -- | 500 | secondary | 10 | N/A |

**Key:**
N/A - not available
GW – groundwater
SW – Surface water, may include samples within the cooling canal system (CCS)
PW – porewater
RW - Rainwater
"EPA" Series method reference: Methods for the Chemical Analysis of Water and Wastes, EPA 600/4-79-020, Revised 1983, with the exception of Gross Alpha
"SW" Series method reference: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, Third Edition, Final Update III.
"SM" Series method reference: Standard Methods for the Examination of Water and Wastewater, 19th Edition

**Notes:**
While some standards listed above are not directly applicable to all aspects of the project, they are provided as partial rational for project MDL requirements.
[1] Class III: Recreation Propagation and Maintenance of a Healthy Well - Balanced Population of Fish and Wildlife (Fresh or Marine Surface Water) FAC 62-302.530
[2] Class G-I: Potable Ground Water Supply.
[3] FAC 62-777 Table 1, Groundwater Clean-up Target Levels http://www.dep.state.fl.us/waste/quick_topics/rules/documents/62-777/TableIGroundwaterCTLs4-17-05.pdf.
[4] Maximum Contaminant Levels for Drinking Water in Florida, http://www.dep.state.fl.us/water/drinkingwater/standard.htm.
[5] Secondary FL Drinking Water Standards.
[6] Project Required MDL's based on applicable criteria, MDLs listed in ADaPT, FAC 62-4.246(3), and laboratory capabilities. MDls based on analytical detection limits and the sample matrix (i.e., salt content).
[7] Waste shall not increase natural background more than 10%.
[8] Greater than or equal to 10% above normal back-ground normal daily and seasonal fluctuations shall be maintained.
[9] Beryllium, annual average not MDL based.

**Table 3.2-1. Analytical Methods and Default QA/QC Targets for Groundwater, Surface Water, Porewater, and Rainfall**

| Method | Matrix | Analyte | Units | Surface Water Standards[1] | | Groundwater Standards | | Drinking Water Standards | | Project Required MDL[6] | Exp. Conc. Range |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Fresh Water (Class III) | Marine (Class III) | GW (G-1)[2] | CTLs[3] | MCL[4] | Secondary[5] | | |

[10] Cd < (e(0.7409[lnH]-4.719))/1000.
[11] Ni ≤ (e(0.846[lnH]+0.0584))/1000.
[12] EPA 900 reference: Prescribed Procedures for Measurement of Radioactivity in Drinking Waters, EPA-600/4-80-032 (Aug, 1980).
[13] Cu ≤ e(0.8545[lnH]-1.702).
[14] Pb ≤ e(1.273[lnH]-4.705).
[15] Zn ≤ e(0.8473[lnH]+0.884).
[16] MDLs are not applicable for calculated parameters.
[17] Salinity may vary from fresh to hypersaline and different methods may be necessary to achieve MDLs.

## Attachment F:

**Table 3.2-4. Summary of Calibration and QC Procedures for Method 200.7**

| QC Check | Minimum Frequency | Acceptance Criteria | Corrective Action |
|---|---|---|---|
| Multipoint calibration curve (minimum five standards and a blank) | Initial calibration prior to sample analysis. | Correlation coefficient > 0.995 for linear regression | Correct problem then repeat initial calibration |
| Instrument Performance Check (IPC) Standard (Calibration verification) | After each initial calibration, every 10$^{th}$ sample, and at the end of the run | After initial calibration, mean concentration of four or more analyses within ± 5% of true value, RSD<3%. Subsequent analyses shall be within 10%. | Reanalyze or correct problem and reanalyze samples run after last acceptable IPC |
| Calibration Blank | After each initial calibration, every 10$^{th}$ sample, and at the end of the run | | |
| Method blank | One per analytical batch | No analyte detected > MDL. | When blank values >10% sample values, re-prepare and analyze method blank and all samples processed with the contaminated blank |
| LCS | One LCS per analytical batch | Recovery within 85-115% of expected results | Correct problem then re-prepare and analyze the LCS and all samples in the affected analytical batch |
| MS/MSD | One MS/MSD per every 10 project samples per matrix | 70-130%Recovery calculations are not required if the concentration added is less than 30% of the sample background concentration | Automatic laboratory reanalysis is required for all unacceptable matrix spikes (and spikes not in the specified spike to sample ratio) in accordance with the process defined in the contract laboratory QA Manual or as detailed in *Standard Methods* (whichever is more stringent). Describe in case narrative any unacceptable results and/or noncompliance |
| Analyte Addition Test | When dilution test fails | Recovery within 85-115% of expected results | If analyte addition <20% sample analyte concentration, perform dilution test |
| Dilution test | Each new sample matrix (i.e., soil or water) | 1:4 dilution must agree within ±10% of the original determination for analyte concentration greater than 50x IDL | Perform post-digestion spike addition for failed analytes |

## Attachment F:

**Table 3.2-4. Summary of Calibration and QC Procedures for Method 200.7**

| QC Check | Minimum Frequency | Acceptance Criteria | Corrective Action |
|---|---|---|---|
| Quality Control Sample | Quarterly to verify calibration standards, from second source | Mean concentration of three analyses within ±5% of true value | Recalculate results; locate and fix problem with system and then rerun |
| MDL study | ~~Once per 12-month period, seven replicates~~. Analyzed per 2009 TNI Standard: EL-V1M4 Section 1.5.2.1 which states the MDL shall be verified on an annual basis.[1.] | Detection limits in Table 3.2-1 | None |

[1.] Use NELAC standards reference until TNI is promulgated in Florida

## ATTACHMENT G:

**Table 3.2-5. Summary of Calibration and QC Procedures for Method SW6010B**

| QC Check | Minimum Frequency | Acceptance Criteria | Corrective Action |
|---|---|---|---|
| ~~Multipoint calibration curve (minimum three standards and a blank)~~ A zero point and single point calibration shall be analyzed with each batch per method 6010B Section 7.3 and 2009 TNI Standard: EL-V1M4 Section 1.7.1.1.h.ii.[1.] | Initial calibration prior to sample analysis. | Correlation coefficient > 0.995 for linear regression | Correct problem then repeat initial calibration |
| Second-source calibration verification | After each initial calibration | Analytes within ±10% of expected value | Correct problem then repeat initial calibration |
| Calibration verification | After every 10 samples and at the end of the analysis sequence | Analytes within ±10% of expected value | Correct problem then repeat initial calibration and reanalyze all samples since last successful calibration |
| Method blank | One per analytical batch | No analyte detected > MQL | When blank values >10% sample values, re-prepare and analyze method blank and all samples processed with the contaminated blank |
| LCS | One LCS per analytical batch | Recovery within 80-120% of expected results | Correct problem then re-prepare and analyze the LCS and all samples in the affected analytical batch |
| MS/MSD | One MS/MSD per every 20 project samples per matrix | Recovery within 75-125% of expected results - calculations are not required if the concentration added is less than 30% of the sample background concentration | Automatic laboratory reanalysis is required for all unacceptable matrix spikes (and spikes not in the specified spike to sample ratio) in accordance with the process defined in the contract laboratory QA Manual or as detailed in *Standard Methods* (whichever is more stringent). Describe in case narrative any unacceptable results and/or noncompliance |
| Dilution test | Each new sample matrix (i.e., soil or water) | 1:5 dilution must agree within ±10% of the original determination for analyte concentration greater than 10x IDL | Perform post digestion spike addition for failed analytes |
| Post Digestion Spike Addition | When dilution test fails | Recovery within 80-120% of expected results | Correct problem then reanalyze post digestion spike addition |

**Table 3.2-5. Summary of Calibration and QC Procedures for Method SW6010B**

| QC Check | Minimum Frequency | Acceptance Criteria | Corrective Action |
|---|---|---|---|
| MDL study | ~~Once per 12-month period~~ Analyzed per 2009 TNI Standard: EL-V1M4 Section 1.5.2.1 which states the MDL shall be verified on an annual basis.[1.] | Detection limits in Table 3.2-1 | None |
| Standard Reference Material (SRM) | SRM will be analyzed by the contract laboratory on an annual basis for parameters identified in Table 4.2-4 | Recoveries within 80 - 120% of expected results. | Report all recoveries in the ADaPT file. Describe in case narrative any recovery that does not meet the acceptance criteria |

[1.] Use NELAC standards reference until TNI is promulgated in Florida

## Attachment H:

### 3.2.3.3 Methods SW1638 & SW1640 – Determination of Trace Metals in Waters by ICP-MS

In order to achieve project MDL DQO's, it may be necessary to analyze trace metals using ICP-MS. Saline samples may be analyzed by ICP-MS using Method 1638. However, additional pre-concentration steps detailed in Method 1640 may be required before analysis to meet the project DQO's.. Method 1640 is applicable for pre-concentration of arsenic (As), beryllium (Be), cadmium (Cd), copper (Cu), lead (Pb), nickel (Ni), selenium (Se), thallium (Tl), vanadium, (V), and zinc (Zn). However, this method is not applicable for barium (Ba), iron (Fe), manganese (Mn), and molybdenum (Mo),which should be analyzed using Method 1638.. Assessment procedures and criteria shall also be addressed if a QAPP modification is required. The pre-concentration techniques must be chosen based on the analytes of interest, and tested on samples representing the broad range of expected salinities encountered in this project, which may vary from nearly fresh to in excess of 70 psu and include potential interferences. A pre-concentration technique meeting project DQOs for the analysis of one target analyte may not be suitable for the analysis of another target analyte. The pre-concentration procedure using reductive precipitation by sodium tetrahydroborate may be a suitable pre-concentration procedure for the analysis of As, Be, Se, and Tl for some project samples. However, the pre-concentration procedure using column chelation may be suitable for the analysis of Cd, Cu, Ni, Pb, V, and Zn. . If recoveries do not meet project DQOs for any samples or analytes, it will be necessary to use an alternative preconcentration system or use a combination of pre-concentration methods to achieve project QA/QC standards and meet DQOs. In addition, to assure that the pre-concentration and analytical method used results in accurate determination of trace metal content in the sample, a certified reference material must be included in the analysis. Since the groundwater samples may have salinity levels from fresh to hypersaline, the following reference materials will be used as a check on accuracy: NASS-6 (seawater reference material for trace metals), CASS-5 (nearshore seawater reference materials for trace metals), or SLEW-3 (estuarine water reference material).

**Table 3.2-6 Summary of Calibration and QC Procedures for Method SW1638/1640**

| QC Check | Minimum Frequency | Acceptance Criteria | Corrective Action |
|---|---|---|---|
| Multipoint calibration curve (minimum three standards and a blank) | Initial calibration prior to sample analysis. | Correlation coefficient > 0.995 for linear regression | Correct problem then repeat initial calibration |
| Second-source calibration verification | After each initial calibration | Analytes within ±15% of expected value | Correct problem then repeat initial calibration |
| Calibration verification | After every 10 samples and at the end of the analysis sequence | Analytes within ±25% of expected value | Correct problem then repeat initial calibration and reanalyze all samples since last successful calibration |
| Method blank | One per analytical batch | No analyte detected > MDL | When blank values >10% sample values, re-prepare and analyze method blank and all samples processed with the contaminated blank |
| LCS | One LCS per analytical batch | Recovery within 70-130% of expected results | Correct problem then re-prepare and analyze the LCS and all samples in the affected analytical batch |
| MS/MSD | One MS/MSD per every 20 project samples per matrix | Recovery within 70-130% (1640-RP[1]), 75-125% (1638, 1640-CC[2]) | Describe in case narrative |
| MDL study | Performed according to 40CFR Part 136, Appendix B | Detection limits in Table 3.2-1 | |

Notes:
1=Method 1640, Reductive Precipitation Pre-Concentration Method.
2=Method 1640, Column Chelation Pre-Concentration Method.

## Attachment I:

**Table 3.2-~~6~~7. Summary of Calibration and QC Procedures for Method SM 3500-Cr B**

| QC Check | Minimum Frequency | Acceptance Criteria | Corrective Action |
|---|---|---|---|
| Calibration curve (minimum one standard and a blank) | Initial calibration prior to sample analysis, standards treated as samples | Correlation coefficient > 0.995 for linear regression | Correct problem then repeat initial calibration |
| Calibration Verification | After every 10 samples and at the end of the analysis sequence | Analytes within ±10% of expected value | Correct problem then repeat initial calibration and reanalyze all samples since last successful calibration |
| Method blank | One per analytical batch | No analyte detected in the MB above the MDL- | |
| LCS | One LCS per analytical batch | Recovery within 85-115% of expected results | Correct problem then reprep and analyze the LCS and all samples in the affected analytical batch |
| MS/MSD | One MS/MSD per | Recovery within 85- | Automatic laboratory reanalysis |

**Table 3.2-~~6~~7. Summary of Calibration and QC Procedures for Method SM 3500-Cr B**

| QC Check | Minimum Frequency | Acceptance Criteria | Corrective Action |
|---|---|---|---|
| | every 20 project samples per matrix | 115% of expected results - calculations are not required if the concentration added is less than 30% of the sample background concentration | is required for all unacceptable matrix spikes (and spikes not in the specified spike to sample ratio) in accordance with the process defined in the contract laboratory QA Manual or as detailed in *Standard Methods* (whichever is more stringent). Describe in case narrative any unacceptable results and/or noncompliance |

## Attachment J:

**Table 3.2-~~7~~8. Summary of Calibration and QC Procedures for EPA Method 245.1**

| QC Check | Minimum Frequency | Acceptance Criteria | Corrective Action |
|---|---|---|---|
| Initial multipoint calibration (minimum 5 standards and a blank) | Daily initial calibration prior to sample analysis | Correlation coefficient >0.995 for linear or non-linear regression | Correct problem then repeat initial calibration |
| Instrument Performance Check (IPC) Standard (Calibration verification) | After each initial calibration, every 10th sample, and at the end of the run | After initial calibration, mean concentration of four or more analyses within ±5% of true value, RSD<3%. Subsequent analyses shall be within 10%. | Reanalyze or correct problem and reanalyze samples run after last acceptable IPC |
| Calibration blank | Once per initial daily multipoint calibration | No analyte detected > MDL | Correct problem then reanalyze calibration blank and all samples associated with blank |
| Method blank | One per analytical batch | No analyte detected > MDL | When blank values >10% sample values, re-prepare and analyze method blank and all samples processed with the contaminated blank |
| LCS | One LCS per analytical batch | 85-115%Recovery | Correct problem then re-prepare and analyze the LCS and all samples in the affected analytical batch |
| MS/MSD | One MS/MSD per every 10 project samples per matrix | 70-130%Recovery | Automatic laboratory reanalysis is required for all unacceptable matrix spikes (and spikes not in the specified spike to sample ratio) in accordance with the process defined in the contract laboratory QA Manual or as detailed in *Standard Methods* (whichever is more stringent). Describe in case narrative any unacceptable results and/or noncompliance |
| Quality Control Sample | Quarterly to verify calibration standards, from second source | mean concentration of three analyses within ±10% of true value | Recalculate results; locate and fix problem with system and then rerun |
| MDL study | ~~Once per 12-month period~~ Analyzed per 2009 TNI Standard: EL-V1M4 Section 1.5.2.1 which states the MDL shall be verified on an annual basis.[1.] | Detection limits in Table 3.2-1 | None |

[1.] Use NELAC standards reference until TNI is promulgated in Florida

**Table 3.2-~~89~~. Summary of Calibration and QC Procedures for EPA Method 300.0**

| QC Check | Minimum Frequency | Acceptance Criteria | Corrective Action |
|---|---|---|---|
| Initial multipoint calibration (minimum 3 standards and a blank) | Initial calibration prior to sample analysis | Correlation coefficient >0.995 for linear or non-linear regression | Correct problem then repeat initial calibration |
| Instrument Performance Check (IPC) Standard (Calibration verification) | After each initial calibration, every 10$^{th}$ sample, and at the end of the run | All analytes within ±10% of expected value | Reanalyze or correct problem and reanalyze samples run after last acceptable IPC |
| Method blank | One per analytical batch | No analyte detected > MDL | When blank values >10% sample values, re-prepare and analyze method blank and all samples processed with the contaminated blank |
| LCS | One LCS per analytical batch | 90-110%R | Correct problem then re-prepare and analyze the LCS and all samples in the affected analytical batch |
| MS/MSD | One MS/MSD per every 20 project samples per matrix | 80-120%R | Automatic laboratory reanalysis is required for all unacceptable matrix spikes (and spikes not in the specified spike to sample ratio) in accordance with the process defined in the contract laboratory QA Manual or as detailed in *Standard Methods* (whichever is more stringent). Describe in case narrative any unacceptable results and/or noncompliance |
| Quality Control Sample | Quarterly to verify calibration standards, from second source | mean concentration of three analyses within ±10% of true value | Recalculate results; locate and fix problem with system and then rerun |
| MDL study | ~~Once per 12-month period~~ Analyzed per 2009 TNI Standard: EL-V1M4 Section 1.5.2.1 which states the MDL shall be verified on an annual basis.[1.] | Detection limits in Table 3.2-1 | None |
| Standard Reference Material (SRM) | SRM will be analyzed by the contract laboratory on an annual basis for parameters identified in Table 4.2-4 | Recoveries within 90 - 110% of expected results. | Report all recoveries in the ADaPT file. Describe in case narrative any recovery that does not meet the acceptance criteria |

[1.] Use NELAC standards reference until TNI is promulgated in Florida

## Attachment L:

**Table 3.2-~~9~~10. Summary of Calibration and QC Procedures for EPA Method 440.0**

| QC Check | Minimum Frequency | Acceptance Criteria | Corrective Action |
|---|---|---|---|
| Initial multipoint calibration (minimum 3 standards and a blank) | Initial calibration prior to sample analysis | Correlation coefficient >0.995 for linear or non-linear regression | Correct problem then repeat initial calibration |
| Instrument Performance Check (IPC) Standard (Calibration verification) | After each initial calibration, every 10th sample, and at the end of the run | All analytes within ±10% of expected value | Reanalyze or correct problem and reanalyze samples run after last acceptable IPC |
| Method blank | One per analytical batch | No analyte detected > MDL | When blank values >10% sample values, reprep and analyze method blank and all samples processed with the contaminated blank |
| LCS | One LCS per analytical batch | 85-115%Recovery | Correct problem then reprep and analyze the LCS and all samples in the affected analytical batch |
| Quality Control Sample | Quarterly to verify calibration standards, from second source | mean concentration of three analyses within ±10% of true value | Recalculate results; locate and fix problem with system and then rerun |
| MDL study | ~~Once per 12-month period~~ Analyzed per 2009 TNI Standard: EL-V1M4 Section 1.5.2.1 which states the MDL shall be verified on an annual basis.[1.] | Detection limits in Table 3.2-1 | None |

[1.] Use NELAC standards reference until TNI is promulgated in Florida

## Attachment M:

**Table 4.2-4. Summary of Parameters (Cations/Anions) and Associated Composition of Standard Seawater for Salinity of 35.000[a]**

| Parameter | Mass Fraction[b] g/kg | Mass Concentration mg/L |
|---|---|---|
| **Cations** | | |
| $Na^+$ | 10.78 | 11,039 |
| $Mg^{2+}$ | 1.28 | 1,311 |
| $Ca^{2+}$ | 0.412 | 422 |
| $K^+$ | 0.399 | 409 |
| $Sr^{2+}$ | 0.0079 | 8 |
| **Anions** | | |
| $Cl^-$ | 19.35 | 19,814 |
| $SO_4^{2-}$ | 2.71 | 2,775 |
| $HCO_3^-$ | 0.126 | 129 |
| $Br^-$ | 0.067 | 69 |

Notes:
a - Actual concentrations may vary depending on SRM used
b - Mass fraction was calculated using a measured density of 1.024 g/mL