SFWMD-FIELD-FSM-001-16

Field Sampling Manual

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Acronyms

A

A/S	Autosampler
ACF	Autosampler Composite Flow
ACODES	Analysis Code. Term used prior to the LIMS implemented in December 2018. After that date ACODES are referred to as "Tests".
ACS	American Chemical Society
ACT	Autosampler Composite Time
ADT	Autosampler Discrete Time
AFW	Analyte Free Water
ASEB	Autosampler Equipment Blank
ATF	Autosampler Composite Time Flow

C

CCS	Closing Control Sample. These are the performed to validate the calibration of the field instrument.
CCV	Continuing Calibration Verification. Referred to in LIMS and in HFDM as the CCS
CH / DH	Clean Hands / Dirty Hands
CLQM	Chemistry Laboratory Quality Manual
COC	Chain of Custody
COND	Specific Conductance
CR10	Campbell Scientific Data logger

D

DBHYDRO	South Florida Water Management District's Water Quality and Hydrological Database
DEP	Department of Environmental Protection
DI	De-Ionized Water (a.k.a. Analyte Free Water AFW)
DO	Dissolved Oxygen
DVS	Data Validation Section

E

EB	Equipment Blank
EMRT	Environmental Monitoring Review Team

EVPA	Everglades Protection Area

F

F	Filter (preservation code)
FAC	Florida Administrative Code
FB	Field Blank
FCEB	Field Clean Equipment Blank
FD	Field Duplicate
FDEP	Florida Department of Environmental Protection
FOC	Field Operations Center
FPM	Field Project Manager
FSM	Field Sampling Manual
FSQM	Field Sampling Quality Manual
FST	First Sample Trigger
FTD	First Trigger Date

G

GPS	Global Positioning System

H

H_2SO_4	Sulfuric Acid
HCl	Hydrochloric Acid
HFDM	Horizon Field Data Manager
HNO_3	Nitric Acid

I

IC	Initial Calibration (See OCS)
ICV	Initial Calibration Verification (See OCS)
ID	Identification

K

KCl	Potassium Chloride

L

LDO	Luminescent Dissolved Oxygen
LIMS	Laboratory Information Management System
LST	Last Sample Trigger

M

MDL	Method Detection Limit
MOSCAD RTU	SCADA Remote Terminal Unit

N

NA	Nitric Acid (preservation code)
NIST	National Institute of Standards and Technology
NOB	No Sample Bottle (AKA No Bottle Sample and No Bottle)

O

OCS	Opening Control Sample – Composed of the IC and ICV.

P

PAR	Photosynthetically Active Radiation
PSR	Pre-login Summary Report
PVC	Polyvinyl Chloride

Q

QA	Quality Assurance
QAO	Quality Assurance Officer
QC	Quality Control
QM	Quality Manual

R

RPD	Relative Percent Difference
RS	Replicate Sample
RSD	Relative Standard Deviation

S

SA	Sulfuric Acid (preservation code)
SDD	Secchi Disk Depth
SDU	Serial Display Unit
SFWMD	South Florida Water Management District (AKA the District)
SOB	Secchi On Bottom
SOP	Standard Operating Procedure
SPR	Sample Problem Report
SS	Split Sample

SSID	Standard Set Identification number
STA	Stormwater Treatment Area

T

TD	Total Depth
TESTS	Analysis Codes used in HFDM. (Formerly referred to as ACODES prior to LIMS implemented in December 2018)

U

USB	Universal Serial Bus
USEPA	United States Environmental Protection Agency

W

WCA	Water Conservation Area
WQB	Water Quality Bureau
WQMS	Water Quality Monitoring Section

Section 1: Introduction

1.0 Quality Commitment

The South Florida Water Management District's (SFWMD) Water Quality Monitoring Section (WQMS) is committed to providing data of known and verifiable quality by supplying the personnel and material resources necessary to assure all monitoring data meet regulatory quality assurance standards and are defensible.

This Field Sampling Manual (FSM), formerly known as the Field Sampling Quality Manual (FSQM), defines the field sample collection and measurement protocols needed to meet the Florida Department of Environmental Protection (FDEP) Florida Administrative Code (FAC) 62-160 requirements. These protocols apply to the collection of surface water, groundwater, atmospheric deposition, soil, sediment, biological samples and field test data collected by the WQMS. The FSM version 10 was the first revision under this alias (SFWMD-FIELD-FSM-001-10). Information formerly provided in the FSQM, and not available in this document can be found in the Quality Manual (QM) SFWMD-FIELD-QM-001, beginning with revision 10.

The specific current FDEP SOPs (DEP-QA-001/01) addressed by this FSM, the QM and WQMS Standard Operating Procedures (SOPs) include: FA1000, FC1000 , FD1000, FQ1000, FS1000, FS2000, FS2100, FS2200, FS4000, FS6000, FS7000, FS8200, FT1000, FT1100, FT1200, FT1300, FT1400, FT1500, FT1600, and FT1700.

The QM contains the following sections which specify the quality assurance system for field sample and data collection.

- Section 1 - Statement of Policy
- Section 2 - Organizational Structure and Key Responsibilities
- Section 3 - Administrative Responsibilities
- Section 4 - Performance and Systems Audits

The FSM has been written as a reference and training guide for WQMS staff and on-site contracted personnel involved in the collection of field data and samples for submittal to the District and/or a contractual laboratory for analysis. Adhering to the FSM's protocols is contractually required of contractors performing work for the WQMS. Where "FSQM" is referenced in WQMS contracts, this FSM is the document to be used by the contractor for sample and field data collection procedures.

1.1 Exceptions and Variance from QA or QC Requirements

It is the responsibility of individual WQMS, internal/external collectors , and Field Unit Supervisors to adhere to project-specific sampling strategies outlined in operational and compliance monitoring plans, appropriate SOPs and protocols outlined herein. In the event that a

variance to a prescribed protocol is deemed necessary for safety or logistic reasons, the approval and/or allowance for said variance must be based on the following criteria:

- The sample collectors may make necessary adjustments as dictated by safety or health concerns. Variances must be noted in the field records and notification sent to the appropriate Field Unit Supervisor(s), WQMS Quality Assurance Officer (QAO), and Field Project Manager(s) (FPM). Data may be qualified depending on the scope and nature of variance.
- For major or prolonged sampling or testing variances, a performance validation study must be conducted and evaluated prior to implementation. This includes changes in the type of instrumentation or technology used for the collection of either samples or data. The validation package along with a revised SOP must be reviewed and approved by the QAO and Section Administrator. Depending on the scope of variance, the QAO may seek approval from FDEP or U.S. Environmental Protection Agency (USEPA) if for National Pollution Discharge Elimination System (NPDES) compliance.
- For minor deviations, defined as within FDEP SOP but outside project-specific requirements, a formal request for a change, including description of the method change and effective date, must be submitted and approved by the QAO prior to implementation and the SOP updated at the same time or shortly after implementation of the change.
- All requests for major methodological changes must be approved by the Section Leads, FPM, QAO and Section Administrator.
- For instances where language in an SOP or monitoring plan is in conflict with the minimum protocols specified herein, the language in this document shall supersede.

1.1.1 Resampling

It is the responsibility of individual WQMS Section Leads and Field Project Managers to adhere to project-specific sample and specific analyte collection frequencies as outlined in operational and compliance monitoring plans. Questions concerning resampling must be brought to the Section Leads and Section Administrator on a case-by-case basis.

1.2 Ethical Expectations

All sampling staff who perform field sampling, field testing and/or data review must commit to following the requirements within the FSM, QM, field SOPs, project-specific requirements found in the project's monitoring plan(s) and/or other management-directed instructions to assure collected data and/or samples are of acceptable quality, traceable and defensible. All WQMS staff (including Field Project Managers and Section Leads) responsible for the collection of field samples and/or data, or who are responsible for data reviews must complete an annual, in-house ethics training course.

After the completion of ethics training, each staff member is required to sign the Ethics and Data Integrity Agreement asserting they will maintain the level of ethics required by the WQMS. WQMS staff and in-house contractors are also required to abide by the State of Florida's Code of Ethics for Public Officers and Employees (Sec. 112.313, Fla. Stat.).

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The following are examples of unethical actions that would be subject to District's Corrective Action Policy:

- Deliberate effort(s) to falsify data and/or records.
- Intentional and/or deliberate deviation from SOPs, FSM or QM without prior approval from a Field Unit Supervisor, Field Project Manager (FPM) and/or a member of the WQMS Quality Assurance (QA) team except for health and/or safety concerns without recording the deviation in the field notes and/or Chain of Custody (COC).
- Negligence and/or failure to use ordinary and/or reasonable care, caution, attention, diligence and/or discretion in the performance of assigned duties and responsibilities.
- Sabotage (e.g., committing or participating in an act of destruction or attempted destruction of SFWMD or employee property or equipment).

In addition to the District's Corrective Action Policy, certain acts and/or omissions may be subject to penalties and punishment under applicable state and/or federal law, including but not limited to those of the FDEP and the USEPA.

1.3 Active SOPs

Active SOPs are located in the Controlled Documents Folder on the WQMS SharePoint site located here.

- Quality Assessment of Field Data (SFWMD-FIELD-SOP-002)
- Surface Water Quality Sampling in Marshes (SFWMD-FIELD-SOP-004)
- Fish and Feather Sample Archiving (SFWMD-FIELD-SOP-005)
- Mercury and other Toxicants in Fish (SFWMD-FIELD-SOP-006)
- Sediment Coring for Mercury and Other Toxicants (SFWMD-FIELD-SOP-007)
- Mercury Sampling in Surface Water (SFWMD-FIELD-SOP-008)
- Mercury in Birds (SFWMD-FIELD-SOP-010)
- Pesticides in Surface Water and Sediment (SFWMD-FIELD-SOP-011)
- Conducting Field Sampling Audits (SFWMD-FIELD-SOP-012)
- Sonde Deployment and Data Retrieval (SFWMD-FIELD-SOP-013)
- WQMS Science Technician Training Certification (SFWMD-FIELD-SOP-015)
- Sediment Coring (SFWMD-FIELD-SOP-017)
- Horizon Field Data Manager (HFDM) (SFWMD-FIELD-SOP-018)
- Blue-Green Algae Reporting (SFWMD-FIELD-SOP-019)
- Archived Records Storage and Retention SOP (SFWMD-FIELD-SOP-022)
- Line Intercept Macrophyte Survey (SFWMD-FIELD-SOP-024)
- Sampling Flow Related Stations (SFWMD-FIELD-SOP-027)
- Qualitative Marsh Vegetation Survey (SFWMD-FIELD-SOP-028)
- Electronic Forms (SFWMD-FIELD-SOP-029)
- Station Registration (SFWMD-FIELD-SOP-031)

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- Correction of Field Records (SFWMD-FIELD-SOP-032)
- Field Project Management (SFWMD-FIELD-SOP-033)
- Quality Assurance Teams Investigations (SFWMD-FIELD-SOP-037)
- Autosamplers (SFWMD-FIELD-SOP-038)
- Field Records (SFWMD-FIELD-SOP-040)

1.4 Annual Review

This FSM will be evaluated on an annual basis to determine if any changes are necessary. This annual review will be recorded even if no changes are necessary. Any revisions to this FSM will be tracked in WQMS's document control system and in Appendix 10 of this FSM. The WQMS QAO is responsible for ensuring that the annual review takes place, and that this FSM undergoes the proper procedures for revision, recall, and archiving as needed.

1.5 References

Florida Department of Environmental Protection (FDEP), Current Version. Chapter 62-160, Florida Administrative Code (F.A.C.) (Quality Assurance (QA) Rule). Division of Environmental Assessment and Restoration, Aquatic Ecology and Quality Assurance Section. FDEP, Tallahassee, FL.

FDEP, Current Version. Standard Operating Procedures for Field Activities, DEP-SOP-001/01. Division of Environmental Assessment and Restoration, Aquatic Ecology and Quality Assurance Section. FDEP, Tallahassee, FL.

South Florida Water Management District (SFWMD), Current Version. Quality Manual, SFWMD-FIELD-QM-001. Water Quality Monitoring Section. SFWMD, West Palm Beach, FL.

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Section 2: Sampling Capabilities

2.0 Water Quality Monitoring Capabilities

Water Quality Monitoring Section (WQMS) is capable of collecting samples in a variety of matrices (e.g., water, soil, sediment, fish tissue and plant material) under a wide range of field conditions. In addition, collectors receive specialized training in sediment, pesticides and ultra-trace metal collection methods. WQMS is responsible for developing and implementing water quality monitoring programs and their associated sampling networks, managing field collection contracts and validating field data.

2.1 Sampling Capabilities

WQMS sampling capabilities, listed in Table 1, are based on the F.A.C. 62-160 (QA Rule) and the FDEP's *SOPs for Sample Collection Activities* (DEP-QA-001/01) (FDEP SOPs). Samples are collected on sampling trips where a "trip" is defined as a single day. Samples for certain projects may be collected over the course of several days and these may be considered sampling events (i.e., several sampling trips on consecutive days or an event could be collected as more than one trip with only two or three days between trips). An example of this would be the PEST trip that is collected over three or four (usually consecutive) days.

Table 1. Sampling Capabilities by Major Category

Parameter	Surface Water	Soil/ Sediment	Rain	Biological Tissues
Cations	X	X	X	X
Inorganic anions	X	X	X	X
Nutrients	X	X	X	X
Metals	X	X	X	X
Physical Properties	X		X	X
Organics	X			
Organic Compounds		X		X
Extractable Organic Compounds	X			
Microbiological	X			
Chlorophyll	X			
Microcystin	X			
Radionuclides	X			

2.2 Field Equipment

Tables 2 through Table 7 list the instrumentation, equipment, and supplies used in the standard collection of surface water samples.

Table 2. Surface Water Quality Sampling Equipment

Category	Equipment Description	Type of Material	Use	Notes
Grab sampling	Horizontal sampling bottle: Van Dorn	PVC, polycarbonate, acrylic	Collection, Sample Processing	1
	Dipper Wand – (golf ball retriever)	Various	Collection	2
	Swing sampler – (extension pole with a 1L bottle)	Various	Collection	2
	Plastic bucket	Polyethylene, white	Sample Processing	1
	Disposable filter unit assembly with pre-filter and 0.45 µm membrane	Polypropylene housing, polycarbonate or other suitable polymer membrane	Filtration (dissolved parameters)	1
	Syringe	Plastic	Filtration	1
	Peristaltic pump (GW)	N/A	Collection	1, 2
	Pump tubing (GW)	Silicone	Collection	1
	Sample bottles	Plastic, HDPE, or Nalgene (metals)	Collection, sample transport and storage	
Auto-sampler	ISCO autosampler or equivalent	N/A	Collection, Sample Processing	2
	Sample bottles, 1 L discrete	Polypropylene	Collection	
	Pump-head tubing/intake tubing/distributor-arm tubing	Silicone/Tygon	Collection	
	Tubing Intake Strainer/ Tubing connectors	Teflon/Stainless Steel	Collection	
	Autosampler 1 L sample bottle caps	Polypropylene	Collection	
	Plastic bucket	Polyethylene, white	Sample Processing	1

NOTES:
1. Not suitable for collection of organics and extractable organics.
2. Does not contact sample.

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Table 3. In-Situ Field Measurement Instrumentation

Instrumentation	Application
YSI (6-Series), PRO-DSS, EXO2	• Temperature measurement • Specific conductance measurement • pH measurement • Dissolved oxygen measurement • Salinity measurement • Chlorophyll • BGA Measurement • Depth
In-Situ Aqua Troll 100, 200	• Temperature measurement • Specific conductance measurement • Salinity measurement
In-Situ Aqua Troll 600	• Temperature measurement • Specific conductance measurement • pH measurement • Dissolved oxygen measurement • Chlorophyll measurement • BGA measurement • Turbidity measurement • Salinity
Turbidity Meter	Turbidity measurement for GW stabilization. May also be used for special applications based on management direction.
Secchi Disk	Water Clarity
Depth Measurement Pole for Marsh Sampling (Paluga Pole)	Marsh depth measurement
HOBO Pendant® Temperature/Light Data Logger 64K	Temperature measurement
HOBO Bluetooth water level logger	GW water level measurement

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Table 4. Sample Bottles

Material Construction	Application
Polyethylene, 60-1000 mL	Inorganics sampling
Opaque (dark) polyethylene 1 or 2 L	Chlorophyll
Opaque (dark) polyethylene 120 mL	Cyanobacteria
Nalgene	Metals
Amber Glass	Microcystin, Organics

Table 5. Sample Preservation Supplies

Category	Material Construction	Application
Preservative	50% Reagent grade H_2SO_4 in plastic dropper bottle or premeasured vial	Inorganics sampling
Preservative	50% Reagent grade HNO_3 in plastic dropper bottle or premeasured vial	Metals sampling
Preservative	pH strips, 0 - 3 range	Preservation verification
Preservative	Ice	Sample cooling for transport
Safety	Safety glasses, gloves	Personal protective equipment
Safety	Acid spill kit	Acid spill neutralization

Table 6. Calibration and Maintenance Kit for Multi-Parameter Instruments

Item Category	**Description**
pH calibration buffers	The range of pH buffers that bracket the expected range of values of the stations on the sampling trip (i.e., day) (pH buffers 7, 4 and/or 10).
Specific conductance calibration supplies	The range of conductivity standards that bracket the expected range of values of the stations on the sampling trip (Note: The lowest standard to be used is 100 µS/cm).
Calibration accessories	Calibration cup with end caps.
DO maintenance supplies	Teflon membranes, O-rings, DO electrolyte solution and LDO cap
pH maintenance supplies	pH electrolyte solution and pH cell caps (reference windows), YSI ProDSS pH Sensor Module kits.

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Table 7. Other Field Supplies

Equipment Description	Application
Coolers large enough to contain all samples and wet ice	Sample preservation and transport
Polyethylene bucket and lid, white	Inorganic sample processing
Various sizes of Storage bags (clean, zip-type, non-vented, colorless polyethylene)	Sample contamination prevention
Large plastic bags	Sampling equipment storage and contamination prevention
Gloves – disposable, nitrile gloves, powder free	Sample contamination prevention and protection of collector from sample preservative, ambient environmental conditions, etc.
Gloves, disposable, vinyl, powder free	Sample contamination prevention and protection of collector from sample preservative, ambient environmental conditions, etc.
Polyethylene trays or fiberglass trays	Provides clean working areas
Measurement PVC Pole	Measuring depth in a water body
Weighted Measurement Depth Tape	Measuring water depth when vessels lack calibrated electronic depth sensors. (E.g., Airboats operating in deep water(s)) or measuring water depth in a water body (stream, canal)
Self-adhesive bottle labels	Labeling
Waterproof, indelible pens	Field records, labeling
Analyte-free water (AFW) (a.k.a. DI Water)	QC (e.g., Field blanks) and equipment cleaning
Meter stick	Measuring depth in a water body, measuring marks on Van Dorn or Secchi lines
Van Dorn vehicle clip / Van Dorn Rack	Provides sturdy Van Dorn mounting on or in the vehicle for ease of processing samples
Sample bottle holder tray	Holds bottles in place while processing samples aboard a boat
Sample Processing Tray	Sample Processing
Field computer	Electronic records, reference materials, email communication, camera
Field note sheets	Field notes
Graduated Cylinder	Autosampler calibration check
Project location maps	Station location
Garmin inReach®	Communication
Digital camera	Station records
Global Positioning Systems (GPS)	Station location
AS Head	Autosampler sample collection

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Equipment Description	Application
AS Battery (Lead acid and/or LiFePO4 as appropriate)	Autosampler power source
Large Latex/Rubber Gloves	Decontamination process

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Section 3: Decontamination Procedures

3.0 Decontamination Procedures

Decontamination (cleaning) procedures are based on the FDEP's SOP FC1000 (DEP-QA-001/01), which specifically requires all equipment in a sampling train (equipment used to collect the sample) be transported to the field, pre-cleaned and ready for use.

Multi-day, overnight sampling events (e.g., estuarine boat collection) must have a new set of pre-cleaned equipment for each day. If this is not possible, the appropriate supplies (i.e., Phosphate-Free soap, Hydrochloric Acid [HCl] and extra Analyte-Free Water [AFW] must be available to conduct the equipment cleaning process off-site (e.g., hotel) as specified in Section 3.2.1. All containers, including transfer containers, must be labeled for the specific contents (e.g., AFW, luminox, HCl, etc.) and include lot number, expiration date, initial and date the container was filled. Acids must be labeled with the appropriate safety sticker as required by District safety protocols. If equipment (e.g., sampling tray) is used that does not touch the sample and consequently is not included in the Equipment Blank (EB), that piece of equipment may be reused on each day of a multi-day sampling event without requiring the full cleaning procedure specified in Section 3.2, as long as it has been cleaned with the field cleaning process specified in Section 3.3. The sampling train equipment must be cleaned according to Section 3.2.1 after returning to the base of operations. The intent is the equipment be cleaned the same day or the following day. The offsite equipment cleaning records (Section 3.2.2), and the Phosphate-free soap and HCl (Section 3.2.3) log pages and/or other appropriate records must be submitted to the laboratory along with the samples and the usual record requirements specified in Section 7.

Equipment surfaces that come into contact with the sample must be protected from exposure to substances and/or surfaces that may contaminate the sample.

Repaired equipment must be cleaned prior to its next use.

New equipment must be cleaned prior to use. If the equipment type or construction is different from equipment already used by WQMS, an EB must be collected. (See Section 8.1)

3.1 Analyte-Free Water (AFW) and AFW Container Cleaning

Analyte-Free Water (AFW) must be obtained from a laboratory that has a QA/QC approved water purification system. AFW Analyte-free water is water in which all analytes of interest and all interferences are below method detection limits. The source of the water must meet the requirements of the analytical method and must be free from the analytes of interest. When changes (i.e., membranes, DI resin, pre/post filters, plumbing, etc.) are made to a AFW system, blanks must be submitted for all analytes submitted to the laboratory. The analytical results from this assessment must all be below method detection limits. Blanks collected for this assessment are

collected like an FB, where no equipment is used (e.g., no filter) and the bottle is rinsed prior to filling.

Sampling staff must use AFW to prepare blanks and to rinse sampling equipment during the cleaning process.

AFW may be stored unused in a transport container or carboy for a maximum of seven (7) calendar days from date signed out, even if taken in the field one day and unused, the AFW can be used the next day on a trip. To minimize long-term storage, contamination and potential leaching, any unused AFW remaining at the end of the sampling day must be discarded and the carboy(s) returned to the base of operations.

If applicable, alternate transport containers are typically 1 L or 250 mL certified-cleaned sample bottles (e.g. marsh flights, TP only trips). They must be labelled with the contents and the date they were filled and must be discarded at the end of the day and not reused.

AFW carboys obtained from the District laboratory at the FOC are usually cleaned and filled by laboratory staff. AFW carboys obtained from the Okeechobee field station laboratory (Okee Lab) are filled with the AFW prepared on site, following the same procedures for cleaning and recording specified below.

A "DI Carboy and Checkout Log" logbook must be maintained by the laboratory or by the personnel who performed the cleaning and must record the following container information:

1. The carboy identification number,
2. The date cleaned and filled with the technician's initials and
3. The check-out date with the initials of the person checking out the AFW.
4. Disposal Date

Disposable AFW carboys must be cleaned before use by rinsing with AFW three (3) times. Carboy spigots are cleaned at the District laboratory and are replaced each time the carboy is cleaned. If a clean spigot is not available, the spigot may be cleaned by rinsing three times if necessary. If a clean carboy is not available from the District laboratory, a dirty carboy may be cleaned using the procedures specified above. If a carboy is available on the "clean" shelf in the District laboratory, but is not recorded as having been cleaned, it must be cleaned according to the procedures specified above and recorded in the logbook by the person cleaning the carboy as having been cleaned. Disposable carboys must be discarded or retired after ten (10) uses. Gloves must be worn when cleaning carboys. If Nitrile gloves are used for carboy cleaning, they must be rinsed prior to handling the sampling equipment as per section 4.0.3.

The identification number of the carboy(s) used on the sampling trip must be listed with the equipment identification data in the field notes.

Non-disposable carboys are not used for normal WQMS and WQMS contractor operations.

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Okeechobee WQMS staff are required to maintain a "DI System Daily Log" (see Appendix 3) and perform a daily check of the AFW system during the work week to ensure the system is running correctly and producing AFW with a low specific conductivity (less than 1 µS/cm). Each morning, the AFW system is flushed for at least one minute by letting the AFW run through both spigots in the laboratory. Next, the three indicator lights (red or green) and the UV light are checked, and their status is noted on the log sheet. Finally, the conductivity reading, time, and initials of the staff member are recorded. Additionally, the date and details of service activities is recorded once a month on the log. At the end of each month, the log is scanned and emailed from the Field Unit Supervisor in Okeechobee, to the QA Team.

3.2 Cleaning Field Sampling Equipment

3.2.1 General Equipment Cleaning Procedure for Surface Water Sampling

Sampling equipment must be cleaned at the base of operations (e.g., the District laboratory, Okeechobee field station laboratory, or away from the base of operations during overnight stays) using the following procedure:

1. Gloves must be worn while handling the equipment. If Nitrile gloves are used for equipment cleaning, they must be rinsed prior to handling the sampling equipment as per section 4.0.3.
2. All surfaces must be washed thoroughly in a sink (i.e. water bath) with hot sudsy tap water and a phosphate-free laboratory detergent such as Liquinox. This includes any drain valves or spigots used to dispense sample water that are attached to Van Dorn(s) or buckets. A brush should be used to remove particulate matter and/or surface film.
3. After washing, all surfaces must be thoroughly rinsed three (3) times with tap water using enough water to assure that all equipment surfaces are thoroughly flushed with water. If washing stainless steel equipment, proceed to step 5.
4. All non-stainless steel equipment must be thoroughly rinsed (all surfaces wet) with analyte grade, 10% hydrochloric acid (HCl). The concentration of the HCl must be 10% w/w (25% v/v) (one volume concentrated hydrochloric acid and three volumes AFW) if available for purchase. If the specified concentration of HCl is not available, HCl acid of a lesser concentration, but not less than 10% v/v, may be used as long as the field QC blank results are at acceptable levels.
5. All equipment surfaces must be rinsed three (3) times with AFW using enough water to assure that all equipment surfaces are thoroughly flushed with water.
6. The equipment must be air dried in a clean, designated equipment drying area.
7. The equipment ID must be recorded in the equipment cleaning logbook.

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3.2.2 Equipment Cleaning Logbook for Surface Water Equipment

Equipment cleaning performed in the laboratory must be recorded in an Equipment Cleaning logbook. The logbook must include:

- The cleaned equipment's unique ID number and/or name (this identifier must be either etched or written with a permanent waterproof marker or a waterproof label on the equipment),
- The date and initials of the person performing the cleaning and
- Each page numbered consecutively.

The procedure used for cleaning equipment must be recorded or cited on each page of the Equipment Cleaning logbook.

For offsite cleaning on overnight trips, the cleaning of the equipment must be recorded including all the information listed above.

3.2.3 Phosphate-Free Detergent & Hydrochloric Acid (HCl) Logbook for Surface Water Equipment

Phosphate-Free detergent and HCl containers must be initialed and dated when received, then stored in the designated area by the field staff. When a new container of phosphate-free detergent or HCl is opened, the date and technician's initials must be marked on the container with a permanent waterproof marker.
Phosphate-Free detergent and HCl used for equipment cleaning must be recorded in a logbook. Each time a new container of phosphate-free detergent or HCl is opened, the logbook entry must include the following:

- Manufacturer
- Lot number
- Expiration date
- Received Date
- Date opened with initials
- The page number for each page of the logbook

Information must be carried down (drawn down with arrow) in the logbook until the next new container of detergent and/or acid is opened.

3.3 Decontamination of Sampling Equipment Between Stations

All sampling equipment utilized for surface water sampling, processing nutrients, major ions, physical parameters, and reused from station to station, must be decontaminated by rinsing three (3) times with AFW immediately after use at each station, placed in a clean plastic bag and sealed (i.e., closed in such a way that the equipment is adequately protected from environmental contamination during transport). The amount of water used to rinse the equipment must be

adequate to assure all surfaces, including drain valves and/or spigots, are flushed with free flowing AFW. Rinsing the sampling tray is required after processing field QC blanks and between the sample and replicate sample collections because it is possible that the tray has come into contact with preservation acids. Before placing the equipment in a clean plastic bag and sealing the bag, the Van Dorn rope must be excluded if not decontaminated.

3.4 Autosampler Equipment Cleaning

3.4.1 General Cleaning Procedures for Autosampler Strainers

The autosampler strainers (Teflon/Stainless Steel) must be cleaned at the base of operations (e.g., the District laboratory or Okeechobee field station laboratory) using the procedures found in the *Autosampler SOP (SFWMD-FIELD-SOP-038)*.

3.5 Groundwater Equipment Cleaning

New tubing is used at each well sampled. Any equipment that is reused between wells (e.g., Depth to water measuring instruments and tapes) must be cleaned with the procedures specified in sections 3.2 and 3.3.

3.6 Pesticide Equipment Cleaning

Equipment used to collect organics samples must be cleaned prior to sampling, at the base of operations and in the field after each use according to *Pesticides in Surface Water and Sediment* (SFWMD-FIELD-SOP-011).

3.7 Sample Bottles (Reusable and Disposable)

Laboratory personnel wash and dry reusable sample bottles (e.g., 2L sample bottles, 1L discrete bottles) with a laboratory grade, phosphate-free detergent (e.g., Liquinox), rinsed with tap water, followed by a 10% w/w HCl rinse and then rinsed with AFW. After this procedure, the sample bottles must air dry completely.

Disposable, certified pre-cleaned bottles are used for all samples submitted to the laboratory. Sample bottles for trace metal analyses other than mercury must be certified pre-cleaned for metals collection from the vendor. Bottles for pesticides sample collection are supplied by the analyzing laboratory.

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3.8 Cooler and Shipping Containers

The interior of the cooler (ice chest) must be rinsed with tap water after use; when heavily soiled, the cooler must be washed with phosphate-free laboratory detergent (Liquinox) and rinsed with cold tap water. If a cooler is to be stored for more than one day, it must be air dried with the lid open prior to storage.

Coolers that are used to transport sediment, soil or plant samples must be clearly marked with waterproof ink and must not be used to store and/or transport water collection samples. Coolers used for the transport of samples must not be used to store items other than environmental samples. Food and/or beverages are never to be stored in a designated sample cooler.

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Section 4: Grab Sampling Protocol

4.0 General Considerations

4.0.1 Sampling Station Location

Sampling station locations (GPS location and descriptions) are listed in the project's operational monitoring plan**.** Station position and registration are performed following the current *Station Registration SOP* (SFWMD-FIELD-SOP-031).

Samples and field parameters must be collected at registered station locations unless a valid justification (e.g., vegetation impact, construction, safety, etc.) for sampling at another location. Science Technicians may make necessary adjustments as dictated by safety or health concerns. Any adjustments must be noted in the field records and notification sent to the appropriate Field Unit Supervisor(s), Quality Assurance Officer (QAO), and Field Project Manager(s) (FPM). Data may be qualified depending on the scope and nature of variance.

Unless an identifiable reference structure (e.g., platform) or natural feature is present, a GPS must be utilized to navigate to a station especially when sampling lake or estuarine stations.

4.0.2 Contamination Prevention

Personnel must strive to prevent contamination of samples, sampling equipment, containers and supplies when collecting samples.

- All sampling equipment must be pre-cleaned, placed in a clean plastic bag, and sealed prior to transportation to and between sampling stations.
- Samples must always be protected from environmental contamination.
- If water quality conditions are known in advance, samples must be collected along an analyte concentration gradient from lowest to highest (e.g., STA outflow stations should be collected prior to STA inflow stations) unless project requirements dictate otherwise as described in the Project's Monitoring Plan.
- Samples must be placed and/or processed on a clean surface included in the field cleaning process such as a sampling tray (a plastic bag/sheet may be used for one time use only, as discussed in Section 3.3.)

4.0.3 Protective Gloves

Protective gloves are required to be worn for all sample processing and cleaning activities to a) protect the collector from exposure to sample constituents, b) minimize accidental contamination of samples by the collector when collecting trace level constituents (i.e., parts per billion levels) and c) protect the collector from acids used to preserve the samples.

Only the Van Dorn rope may be touched with ungloved hands as the Van Dorn is deployed into the site water and the sample is collected. However, preparing the Van Dorn for sample collection (e.g., opening the gaskets), sample processing and cleaning activities must all be done while wearing gloves.

Gloves must:

- Be clean, new, un-powdered and disposable latex, vinyl, nitrile gloves (alternative glove materials must be assessed with a new equipment blank and be approved by the WQMS QAO prior to use (See Section 8.1)
- **Nitrile gloves are a possible contaminant for NOx. Special care must be taken to prevent contamination of the sample if NOx (Grey Bottle) is collected or processed.**
- When collecting or processing a sample being submitted for NOx using nitrile gloves, the gloves must be rinsed prior to use to remove surface residue left over from the glove manufacturing process.
- After putting on a pair of new gloves, rinse the entire surface of both gloves with AFW while gently rubbing hands together to remove any surface residue before Nitrile handling sampling equipment or sample bottles.
- The amount of water used to rinse the gloves must be adequate to assure all surfaces are flushed with free flowing AFW.
- **For Marsh sample collection**, site water may be used for rinsing the gloves. The gloves must be submerged while gently rubbing hands together to remove any surface residue before moving to the sample collection location. Prior to marsh sample processing, Nitrile gloves must be rinsed with AFW.
- When collecting or processing samples or blanks that are not being submitted for NOx, Nitrile gloves do not have to be rinsed.
- If vinyl gloves are used, they do not need to be rinsed.
- gloves must not be used to cover the AFW carboy spigots.
- Gloves are not to come into contact with the collected sample, or the interior of sampling equipment, sample composite container, or the sample bottle,

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Gloves must be changed:

- After collecting and/or processing all sample bottles for a single sample or QC sample (i.e., dash number).
- If torn or used to handle extremely dirty or highly contaminated equipment.
- Prior to collecting field QC blanks

4.0.4 Determining Representativeness of Sampling Conditions

Representativeness, an extremely important data quality indicator, addresses the extent to which measurements or samples reflect the target population (e.g., water body, sediment sample, etc.) from which they were measured or taken.

Samples must only be collected if they are representative. Water samples are considered representative if they are contiguous with the main water body or part of the bulk water flow being sampled. Sediment samples are considered representative if they are representative of the target area from which they are collected. Contaminated samples are not representative and must be discarded. "Contamination" in this context means anything that would make the sample non-representative of the water body being sampled (e.g., terrestrial insect in the sample, vegetation) or surface materials (e.g., periphyton or detritus from macrophytes) in a sediment grab sample.

Non-representative grab sample areas may include, but not be limited to:

- Samples with obvious, excessive, unrepresentative biological material (e.g., terrestrial/aquatic insects, amphibians, fish);
- Samples with an unusual (for the station) amount of suspended sediments (e.g., may be indicative of bottom disturbance as the collector moves through a marsh);
- Disconnected pools or areas of a marsh or canal that are dry to the point where there is no obviously broad connection between pools and no observable sheet flow is present; and/or
- Sampling stations within the STAs, where the main marsh is dry, but water is in the perimeter collection canal.
    - The District will officially declare dry-out conditions and suspend sampling when this occurs. WQMS can initiate this process by contacting the Permit Acquisition and Compliance Section.
- Samples should not be collected in areas where vegetation impacts the collection of a sample or is covering a sampling area.

Samples determined to be unrepresentative of the contiguous body of water being sampled, must be qualified with a 'J' qualifier in the database. Samples (e.g., marsh samples)

collected from "disconnected pools" must carry the comment “Sample collected from a disconnected pool and is not representative of the surrounding water body,” in addition to this qualifier.

If samples are identified as contaminated or nonrepresentative and are either discarded or qualified, the field project manager must be notified as soon as possible so they can determine if sample recollection is necessary.

4.0.5 Grab Sample Rejection Criteria

Collectors are responsible for visually inspecting and accepting/rejecting each collected sample. The criteria for rejection listed in Table 8, are not all inclusive. If an initial grab sample is deemed non-representative, it must be discarded and another attempt made to collect a representative sample. Questions concerning the rejection of any sample should be directed to the WQMS QA Team, Field Unit Supervisor and/or FPM, any decision must be made prior to relinquishing the sample to the laboratory if possible.

- Records must be complete and clearly explain the reason for rejecting the sample.
- Record observed conditions that directly affect the quality of a sample and/or field data. These observations must be noted in the Notes section of the COC for the affected sample.
- Digital images should be taken, sent to the FPM, if the images assist in recording the conditions, note in the comments.
- Samples identified as contaminated in the field (defined above) must be discarded.
- If a sample is found to contain contaminants after it is submitted to the laboratory and before analysis it may be rejected according to WQMS and/or laboratory protocols.
- If a sample is identified as contaminated after it is analyzed, the resultant data must be qualified as rejected with a ‘?’ qualifier by the QA Team.
    - Samples acidified with preservation acid that were not supposed to be acidified or samples that were acidified with the incorrect preservation acid (e.g., HNO3 vs H2SO4) are considered contaminated and the analysis must be cancelled if possible and if not, the data must be qualified with a ‘?’ qualifier.
- If samples are identified as contaminated or nonrepresentative and are either discarded or qualified, the Field Project Manager must be notified as soon as possible, so they can determine if sample recollection is necessary.

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Table 8. Grab Sample Rejection Criteria

Collection Type	Observation(s)	Field Action
Grab Sampling	Phytoplankton and zooplankton, when evenly distributed throughout the water column, would not warrant rejection of the sample.	Sampling staff should not reject a sample with a presence of plankton that are evenly distributed throughout the water column.
	Presence of biological material (e.g., invertebrate(s), fish tissue, etc.) within a sample aliquot that do not reflect the material's distribution at the station are not representative of the water body being sampled.	Sampling staff must discard and recollect.
	Presence of vegetation particulates.	Sampling staff must decide whether a sample is representative and must record the observed condition in the field notes (digital photos taken if possible). Non-representative samples must be discarded, and another sample collected.
	Presence of unusually high amount of sediment. The presence of sediment and/or particulates in a sample may be representative of some areas and/or typical for some projects.	Sampling staff must determine whether a sample is representative and record the observed condition in the field notes.

4.0.6 Sampling Depth

Sampling depth is defined as the depth at which the sample is collected. Sampling depths may vary based on the physical condition of the station and/or project requirements. Sampling depths for sediment and/or groundwater are specified in each project-specific monitoring plan and/or SOP. Measuring Total Depth (TD) for marsh sample collection is specified in the *Surface Water Quality Sampling in Marshes SOP* (SFWMD-FIELD-SOP-004). When measured, the total depth for marsh collection is recorded, even if the sample is not collected because the depth is too shallow.

4.0.6.1 Surface Water Grab Total Depth and Sampling Depth

- Depth measurements for surface water collection are recorded in meters, if applicable, groundwater measurements are in feet. Total Depth (TD) is measured using a marked line with a weight attached, tape or other measuring device with a fixed total length (e.g., meter stick, piezometer).
- Total Depth (TD) is the depth to the bottom of the water body or column being sampled.

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- When collecting from a boat, TD must be determined prior to the sample collection or the multi-parameter instrument profile measurement.
- The sampling depth must be recorded for all grab samples. Equipment used for collecting grab samples must be marked with depth increments to assure accuracy (the rope must be marked starting from the center of the collection device up to the total depth of the water being sampled).
- Most projects specify that surface water grab samples are collected at a depth of 0.5 m (±10%) from the surface of the water. If TD is < 1 m, the sample must be collected at one-half of the TD unless otherwise specified in the project's monitoring plan. Certain project operational monitoring plans specify sample collection depths for the sample and/or additional samples collected within the water column (e.g., SE and IRL).
- Field parameters (multi-parameter instrument readings) must be measured at the sampling depth unless otherwise specified in the corresponding sampling SOP or the project-specific monitoring plan (e.g., marsh). When sampling from the side of a body of water with a YSI ProDSS ***and*** the TD is ≤ 0.5 m, field parameters MUST NOT be collected. The depth limit of 0.5 m is based on the size of the YSI sonde probes (with guard), which measure 0.2 m in length.

4.1 Grab Sample Collection Procedures

A surface water sample:

- Must be collected by a Van Dorn water sampler, dipper wand, intermediate bottle or sample bottle.
- Total samples (i.e., unfiltered samples for TN, TP, etc.) must not be filtered or otherwise passed through any sieve, netting or screen like material or substance that could alter the contents or constituents of the parent sample such that it is not representative of the target population. Total samples (i.e., unfiltered samples for TN, TP, etc.) are processed before the dissolved (filtered) samples. The intent is that the total sample concentration can indicate the overall extent of contamination, while the dissolved samples reveal the proportion of contaminants that are actually available to organisms.
- Surface water samples must be collected in such a fashion that the sample does not include disturbed sediments, settled particulates, detritus, plant material and/or periphyton that are the result of the collection process.
- Must be collected at the specified sampling location, which is typically upstream of the specified structure.

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- If the sample cannot be collected at the specified station location, and if no location is available immediately upstream, the station should be considered a "no bottle sample" (NOB) station, the reason recorded, and the supervisor and/or the FPM must be notified. Also, the collection date/time (The month, day, year and time a sample is collected) for a NOB is the date/time when it is determined that the sample will not be collected, or the station will not be visited.

- Must be collected at the same sampling station as the autosampler when possible.

- The sample collector should strive to minimize disturbing sediments as they traverse the marsh to the sampling area and when they collect a sample.

- If the sampling station is completely impacted by submerged, emergent, and/or floating vegetation (i.e., there is no vegetation-free area large enough to insert the sampling device) the sample must be collected upstream as close to the normal sampling station as possible such that the collected sample is still representative of the target water body. The FPM and /or supervisor must be consulted prior to sample submission if at all possible.

- Vegetation must not be mechanically removed to collect a sample.

If directed to collect any sample outside the standard procedures (e.g., grab pump sample collection using the autosampler), the sample collection authorization and activities must be recorded in the field notes and in the description section of the COC. ***The Field project manager must notify the QA Team when this occurs. The QA Team will investigate and determine if qualification of the data is necessary.***

- When sampling from a bridge, platform, wingwall or other man-made structure that allows for safe collection of a sample from directly above the water body AND the total depth (TD) is ≥ 0.4 m, then a Van Dorn must be used unless collection of a representative sample is inhibited by vegetation and/or other conditions.

- If collection of a representative sample is not possible with a Van Dorn, then a sample via an intermediate sampling container (swing sampler with 1L bottle) must be used if it is possible to get a more representative sample. When sampling from the side of a body of water AND the TD is ≥ 0.4 m, then a sample via an intermediate sampling container (swing sampler with 1L bottle) must be used. The depth limit of 0.4 m is based on the 1L bottle measuring 0.2 m in length.

- If collection of a representative sample is not possible with the intermediate sampling container due to depth, vegetation, etc., then a direct bottle grab with a dipper wand and a 120 mL bottle must be used for the collection of TN, TPO4 or TPO4 only. A 120 mL bottle is to be used in a total depth of > 0.2 m.

- If TD is ≥ 0.10 m and ≤ 0.20 m, then the sample must be collected directly into a 60 mL sample bottle at half the TD safely by hand and if representative.

- If TD is < 0.10 m, then the sample is not collected because the sample will not meet the representativeness data quality objective. Data resulting from a sample collected from a depth of < 0.10 m must be qualified with a '?'.

- If from a safe location or established sampling platform the total depth cannot be clearly determined, then the sample must not be collected and must be recorded as a NOB.

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- Clear comments MUST be made recording the type of equipment used, conditions at the station and representative nature of the sample collected.

The following sampling procedures must be employed when relevant:

- Sample *collection* equipment (e.g., Van Dorn, intermediate sampling container) must be rinsed with site water three (3) times prior to collecting a sample.
- The rinsate volume must be adequate so that all surfaces of the equipment are thoroughly flushed.
- The rinsate must be taken from an adjacent and continuous area at least several feet from the sample collection area.
- The rinsate must not be discarded in the sample collection area.
- Sample *processing* equipment (e.g., syringe and/or sample composite bucket, including the spigot) must be rinsed three (3) times with sample water prior to processing a sample.
- If using a sample composite bucket, the collection of the sample must be repeated (after the initial three (3) rinses of the collection equipment with site water) until the sample composite bucket contains enough sample water to ensure all sample bottles can be filled from the same distinct composited source.
- Sample bottles must be rinsed one (1) time with a portion of the water being processed (i.e., filtered or unfiltered) prior to filling the bottle. Rinsate is discarded and then the bottle is filled with sample and capped.
- The sample bottle ***must not*** be rinsed when collecting samples for extractable or non-extractable organics for pesticides in glass bottles.
- Pre-acidified bottles must not be rinsed (i.e., MeHg).
- The grab sample must not be collected inside (downstream) of the weed rake closest to the pump station. There should always be at least one weed rake between where the grab sample is collected and the pump station for safety reasons.

4.1.1 Direct Grab Sampling

A direct grab sample is collected by holding a sample bottle in a gloved hand and inserting the sample bottle into the water column and filling it with water. Care must always be taken to assure the sample is not contaminated by the suspension of sediments or other benthic materials during the collection process that would cause the collected sample to not be representative of the overlying water column. This is especially important in shallow waters in marsh environments. A direct grab sample must be collected following this procedure:

- The sample bottle must be rinsed one (1) time with site water before the bottle is filled and capped.

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- The bottle cap is removed, and the bottle is positioned perpendicular to the surface of the water with the opening over the water surface.
- The bottle is slowly submerged to the appropriate sampling depth.
- Invert the bottle so the opening is upright and pointing upstream into the oncoming direction of water flow (if applicable). Allow water to run slowly into the container until filled, remove the bottle from the water column and cap.
- If a dipper wand is used for the collection of samples directly into a 120 mL sample bottle when the Total Depth is > 0.2 m:
    - The dipper wand consists of a pole with a fixture at its end that allows the attachment of a sample bottle.
    - The wand ***must have*** a sample depth indicator attached to the fixture to ensure the sample is collected at 0.5 m or less depending on Total Depth.
    - The sample bottle must be rinsed one (1) time with site water before the bottle is filled and capped.
    - A dipper wand must not be used from a height that is greater than the length of the dipper wand when fully collapsed, i. e. 115 cm or 45 inches. The reason for this is related to proper sampling depth. If the bottle is inserted into the water at too steep an angle, it will fill with some (or all) water from the surface of the water column, instead of water from a proper sampling depth. The intent is for all the sample to be collected from the stated sampling depth (e.g., 0.5 m). The filled bottle should be quickly removed from the water column and the sample bottle capped.

4.1.2 Grab Sampling from a Boat

When a boat is used to access a station, the sample must be taken from the bow of the boat (i.e., away from the bilge pump outlets and engine exhaust). If it is not possible to collect safely from the bow, the sample must be collected from forward of midship to get as far away from the bilge and stern as possible. The sample must also be collected upwind of the motor, if possible.

4.2 Grab Sample Processing

- To reduce the possibility of contamination, samples must be placed and/or processed on a clean surface included in the field cleaning process such as a sampling tray (a plastic bag/sheet may be used for one time use only at one station).
- Only one set of sample bottles labeled with the same pre-login dash numbers are allowed on the processing surface at any time.
- To ensure sample homogeneity, all composite samples must be thoroughly mixed (i.e., by agitating the bucket or Van Dorn) before each sample bottle is filled. The Van Dorn must be lifted approximately 45 degrees from horizontal and then returned to the original position to assure the water inside the device “sloshes” to keep the solids suspended. Agitation of the Van Dorn, or

bucket, by the collector, must take place between the filling of sample bottles and not during the filling of sample bottles.

- The set of sample bottles with the same pre-login number must be filled from the same composited sample collected. The only exception for this requirement is when the chlorophyll sample bottles are collected for projects SE, IRL, and OLIT.

- Total samples (i.e., unfiltered samples for TN, TP, etc.) are processed before the dissolved (filtered) samples. The intent is that the total sample (i.e., unfiltered samples for TN, TP, etc.) concentration can indicate the overall extent of contamination, while the dissolved samples reveal the proportion of contaminants that are actually available to organisms.

4.2.1 Sample Filtration

- Filters (0.45 µm) must be stored by lot number in a sealed, plastic container or bag at all times.
- Filters must be used for one sample (i.e., dash number) only, then discarded.
- Unfiltered samples must be filled before filtered samples.
- Samples requiring filtration are collected with a surface water collection device (e.g., Van Dorn, intermediate sample container, etc.) and then filtered with an attached in-line disc or capsule filter using a syringe. A peristaltic pump can be used with a capsule filter.
- During filtration of the sample or blank, the filter must be removed from the syringe before pulling out the plunger from the syringe. This prevents filter damage/failure that could compromise samples.
- In-line disc filters used with a syringe must be rinsed (purged) with a minimum of 30 mL of the sample water (samples) or AFW (QC blanks) ***prior to*** filling the sample bottles, this process must be consistent throughout the sampling event. The water used to rinse the filter is discarded. The remaining sample water or AFW in the syringe can be used to rinse sample bottles, if applicable. The filter must not touch or be placed on the sample bottle during filter processing, due to the possibility of sample contamination.
- Capsule filters used with a peristaltic pump and/or syringe must be rinsed (purged) with a minimum of 250 mL of the sample water (samples) or AFW (QC blanks) ***prior to*** filling the sample bottles, this process must be consistent throughout the day's trip. The tubing associated with the peristaltic pump must be rinsed with an adequate amount of sample water or AFW prior to collection of the respective filtered samples or filtered blanks.
- Pre-acidified samples are not filtered, due to the possibility of the acid damaging the filter and contaminating the sample.

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4.2.2 Acid Preservation

Preservation Acid Storage in the Field

Preservation acids can be contaminated in the field by dust and dirt in the backs of vehicles. In addition, HNO3 can easily contaminate the H2SO4; therefore, it is imperative that these two acids are protected from contamination during transport and storage in the field. If applicable, all other preservatives must follow the procedures as listed in this section.

Acid dropper bottles containing the preservation acids H_2SO_4 and HNO_3 must be kept in separate, dedicated, rigid, plastic containers, which have a secure seal and are labeled. The containers must always be sealed when not in use and must be replaced when they no longer provide a seal that prevents exposure (e.g., container won't stay closed, seal is compromised). The acids are shipped in a cardboard box. This box is not adequate for storage in the field. If the box comes with a plastic overwrap, this is not sufficient to keep the acid protected. If used, the cardboard box must be placed in a plastic container that must be sealed in the vehicle.

Alternative storage in designated containers in field sampling kits for each technician, which are then stored at room temperature overnight, are acceptable.

Samples must be acid preserved in the field within 15 minutes of sample collection with the exception of those not processed and/or acidified on site, such as ultra-trace mercury and samples from remote stations accessed by helicopter.

- The acid type, lot number, and amount of acid added per volume of sample bottle and the result of the pH value within range ***must be*** recorded in the field notes. The lot number for the acid is located on the outside of the box the acid droppers come in. The dash in the lot number may be omitted.
- Acid dropper bottles must be dated and initialed by sampling personnel when first opened; opened bottles that are not dated and initialed should be discarded. If the open acid dropper box is not available at the point where being used, then the acid dropper lot number needs to be applied to the open acid dropper.
- H_2SO_4 and HNO_3 acid dropper bottles must be discarded within one month (30 calendar days) from the date when they were opened. The opening date of the preservation acids in the vehicle must be checked daily prior to use.
- The acids used must be American Chemical Society (ACS) reagent grade or higher quality acid preservatives provided by the District or contract laboratory.
- Sample preservation and holding times are found in Table 9.

The sample processing procedure for the **acid preserved samples** listed below ***must be performed in the order listed***:

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1. All non-chemically preserved (e.g. 4C only) bottles are filled, capped, and placed in ice within a cooler dedicated to sample collection before proceeding to step 2.
2. All acid preserved bottles must be acidified, and each sample bottle checked for proper pH range ***between 1.3 and 2.0 units*** at the time of processing.
    a. After the acid-preserved sample bottle is capped and shaken, the pH must be checked by pouring a small amount of the sample onto a narrow range pH test strip (0 - 3 pH units). The pH strip must ***never be inserted*** into the sample bottle.
    b. If the acid-preserved sample has a pH $\geq$ 2, then a single drop of acid must be added to the sample bottle and the pH retested. This procedure must be repeated until the pH < 2. Care must be taken not to over-acidify the sample. The number of added drops must be recorded in the field notes.
3. Samples and field QC blanks to be submitted for ammonia (Grey Bottle) are to be acidified with a minimum of 5 drops of sulfuric acid (H2SO4) in the 60 mL bottle.
4. Each H_2SO_4 preserved bottle is capped and placed into a cooler, up to its neck, in ice before proceeding to step 5.
5. All nitric acid (HNO_3) preserved bottles must be acidified and each checked for proper pH (see 2a and b above).
6. Each HNO_3 preserved bottle is capped and placed into a cooler, up to its neck, in ice.

All field QC blanks must be preserved with the greatest amount of preservative that was required in the associated sample set; note the amount in the field records. Excess acid preservation may interfere with laboratory analysis of the sample so the pH must not be less than pH 1.3 S.U.

4.2.3 Thermal Preservation

- Samples that require thermal preservation must be placed in ice within 15 minutes of collection.
- Enough ice must be used such that the sample bottles are submerged to the bottle's neck. This is necessary to cool the samples as quickly as possible.
- Coolers used for the transport of samples must not be used to store items other than environmental samples. Food and/or beverages are never to be stored in a designated sample cooler.
- Coolers used to transport sediment, soil, or plant samples must be clearly marked with waterproof ink and must not be used to store and/or transport water collection samples.Food and/or beverages are never to be stored in a designated sample cooler.

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- Samples when hand-delivered to the District laboratory, must be placed in the sample receiving area or in a designated refrigerator.
- When samples arrive after regular laboratory operating hours, samples must be stored overnight in the laboratory designated refrigerator, and the associated COC must be affixed to the clipboard at Login. If the COC is unavailable to be affixed to the clipboard at Login, an email to chemlab@sfwmd.gov must be sent, copying the FPM and including a detailed explanation. The WQM QA Team should also be copied on the email.
- If samples must be kept in a cooler (i.e., not in a refrigerator) overnight:
    - They must be kept in sufficient ice to keep them cool the entire night.
    - This must be recorded on the COC, as well as where the cooler was stored.
    - The cooler must be drained, and new ice applied prior to shipping.
    - The samples must be delivered to the laboratory the next day so the samples can be analyzed within the required analyte holding times.
- Samples collected by sampling groups that are not located at the FOC may be stored in a refrigerator overnight at the base of operations and shipped to the laboratory the following day. If samples are not stored in a refrigerator overnight prior to shipping, then a comment must be made on the COC describing how the samples were stored (e.g., samples stored in cooler, submerged in ice overnight prior to shipping). This comment can be made on the "Other" line of the Signature Page of the printed COC.
    - Samples stored in a refrigerator prior to shipping must be maintained at a temperature > 0^{o}C and ≤ 6^{o}C. Water samples must not be allowed to freeze.
    - The temperature for any refrigerator must be measured using a NIST traceable thermometer and recorded each working day during the period that samples are stored. A back up technician must be assigned to ensure the daily temperature checks are completed in case the primary technician is not available
    - The temperature reading of each instrument will be recorded once daily each working day (Monday through Thursday) on the Temperature Monitoring Log. During office closures (holidays, weekends, mandatory district closures) temperatures are monitored with a thermometer capable of recording minimum and maximum temperature. Thermometers are reset by staff the morning before office closures. Verification that the temperature range was within acceptable limits is recorded on the Temperature Monitoring Log the morning immediately following the office closure.

- To record temperature verification during office closure staff must:

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- Upon taking the temperature log on the day preceding office closure, staff must reset the min/max thermometer by holding in the min/max button until the display flashes.
- Upon return of the immediate office closure staff must verify the min/max range is > 0°C and ≤ 6°C.
- If the min and max are inside the range, the letters "IC" for "In Compliance" are placed in the space with the persons initials for all days during the office closure.
- If the min or max are outside the range, the letters "OC" for "Out of Compliance" are placed in the space with the persons initials for all days during the office closure AND the QA team is immediately notified of the exceedance with an accounting of exactly which samples were located within the refrigerator during the time of office closure.
- If a NIST traceable thermometer is not available, the refrigerator must not be used.
- NIST traceable thermometers used in refrigerators must be replaced prior to the expiration date listed on the Certificate of Calibration. If no expiration is stated, the thermometer must be recertified or replaced annually. Thermometer Certificates of Calibration are stored with the WQMS QA Team and at the Okeechobee Field Station.
- When replaced, the old and new thermometers must be deployed next to each other in the refrigerator for a minimum of two days so that there are two daily readings of the two thermometers. The readings of the new thermometer are recorded in the comments section of the temperature log. The readings must agree within the stated accuracy of the thermometer as stated on the Certificate of Calibration. If they do, then the install date is recorded, and the new thermometer is used from that point onward and the old thermometer is discarded. If the temperature readings on both thermometers are different, contact a member of the QA team for further instructions.

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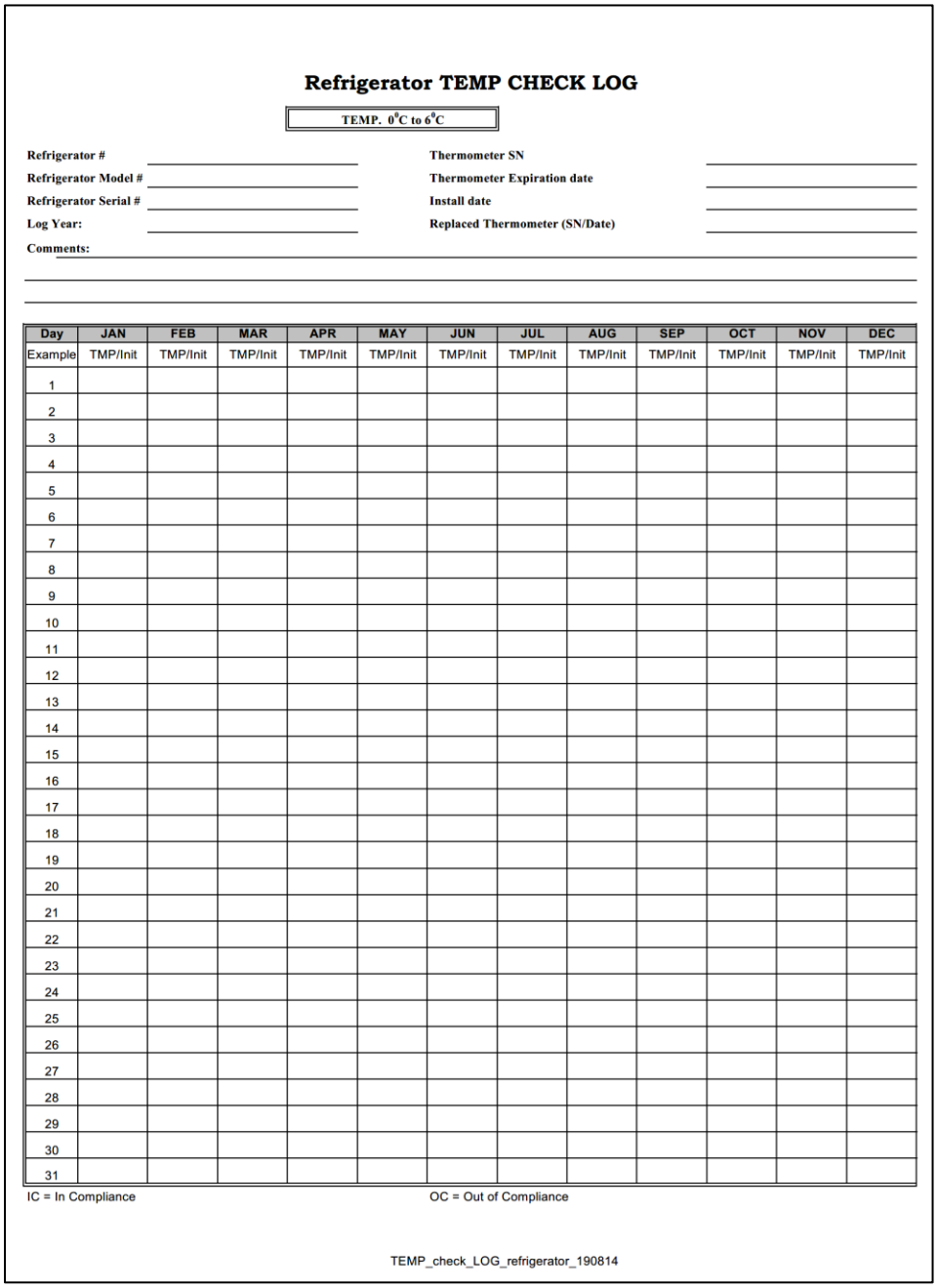

Refrigerator TEMP CHECK LOG

TEMP. 0°C to 6°C

Refrigerator # _____ Thermometer SN _____
Refrigerator Model # _____ Thermometer Expiration date _____
Refrigerator Serial # _____ Install date _____
Log Year: _____ Replaced Thermometer (SN/Date) _____
Comments: _____

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Example	TMP/Init	TMP/Init	TMP/Init	TMP/Init	TMP/Init	TMP/Init	TMP/Init	TMP/Init	TMP/Init	TMP/Init	TMP/Init	TMP/Init
1												
2												
3												
4												
5												
6												
7												
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IC = In Compliance OC = Out of Compliance

TEMP_check_LOG_refrigerator_190814

Figure 1. Sample Refrigerator Temperature Check Log

4.2.4 Discarding Remaining Sample

The volume of sample remaining from sample processing must be discarded in such a way it does not pose the potential to contaminate the area where other samples are to be collected (e.g., discarding sample where replicate samples are to be collected, discarding autosampler sample in an area where the grab sample is to be collected, etc.).

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4.2.5 Decontamination of Sampling Equipment at the Last Station

All equipment utilized for surface water sampling, processing nutrients, major ions, physical parameters, and reused from station to station must be decontaminated by rinsing three (3) times with AFW immediately after use at each station.

Rinsing sampling equipment with AFW is optional at the last station, but ONLY if the sampling equipment will be cleaned at the base of operations within 24 hours after the completion of a sampling event, following the procedures described in 3.2.1 General Equipment Cleaning Procedure for Surface Water Sampling. If it is unlikely that the sampling equipment will be cleaned at the base of operations within 24 hours, then the sampling equipment must be rinsed with AFW at the last station and sealed in the plastic bag until it can be cleaned.

4.3 Sample Transport to The District Laboratory at the FOC and Contract Laboratories

- Samples hand-delivered to the District laboratory must be placed in the sample receiving area or in a designated refrigerator.
- Samples must not be left on the counter/bench top for more than one hour. If an extended time to complete the paperwork is expected, notify Log In.
- Print the multi-lab COCs from LIMS using the "PUB" account (see the *HFDM SOP*, SFWMD-FIELD-SOP-018 Appendix 1, Section A or the *Correction of Field Records SOP*, SFWMD-FIELD-SOP-032, Appendix 2).
- Do NOT use the Field App to print the multi-lab COCs.
- For contract Shipping see the shipping procedures for the specific SOPs below
    - *Mercury and other Toxicants in Fish* (SFWMD-FIELD-SOP-006)
    - *Sediment Coring for Mercury and Other Toxicants* (SFWMD-FIELD-SOP-007)
    - *Mercury in Surface Water* (SFWMD-FIELD-SOP-008)
    - *Pesticide Sampling in Surface Water and Sediment* (SFWMD-FIELD-SOP-011)
- If applicable, the samples are packed and shipped the same day of collection.
    - Line a cooler with double-bagged large, heavy-duty polyethylene bags and place a temperature blank inside the lined cooler.
    - Place bagged samples inside the lined cooler with ice below, on top and between samples.
    - Tightly secure each heavy-duty bag to prevent leaking during shipment (e.g., zip tie).
    - Place the original, signed COC in a re-sealable zip-type bag. Place the bagged COC in the sample cooler.

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- Use shipping tape (or a similar adhesive product) to securely tape cooler shut. Sign and date a custody seal label and place it perpendicular across the seal of the cooler and the lid. Place a shipping label on the cooler in a location where it is easily visible (i.e., the lid or side, not the bottom of the cooler).
- Place cooler in the shipment pick-up location.

- Samples collected by the Okeechobee field group are typically stored overnight in the on-site refrigerator. The samples are then shipped the following morning via courier to the FOC.

4.4 Sediment Sample Collection

4.4.1 Grab Sediment Sampling

Grab sediment samples are collected using a stainless-steel scoop/spoon (utilized only in non-flowing shallow waters), a stainless-steel petite PONAR dredge, a stainless-steel coring device and/or other suitable device.

Deep-water sediment samples (e.g., canal) are typically collected from a small boat with a petite PONAR dredge. The dredge is lowered via a line through the water column until it makes firm contact with the bottom, then it is triggered to collect sediment, It is slowly retrieved to the surface where it is emptied into a stainless-steel bowl/tray for processing.

4.4.2 Sediment Core Sampling

Varieties of methods for collecting cores in both shallow and deep waters have been utilized and are typically project-specific. collector must consult the project's operational monitoring plan and/or appropriate SOPs (e.g., *Sediment Coring for Mercury and other Toxicants SOP* (SFWMD-FIELD-SOP-007) and *Sediment Coring SOP* (SFWMD-FIELD-SOP-017) to identify and review the desired methodology.

4.5 Groundwater Sample Collection

Groundwater samples collected for WQMS projects must be collected according to the protocols specified in the FDEP SOP FS2200 and FT1600, found in SharePoint synced folder *FSM-QM*. Bailers or bailing type sampling devices must not be used for purging or sampling groundwater wells for WQMS projects. The preferred purging and collection method for monitoring wells is the "Minimized Purging Volume" method specified in FDEP SOP FS2213 Sections 1.1.1 and 2.1. Depths for groundwater sample collection are in recorded in feet.

4.6 Biological Sample Collection

Collection, processing and archiving procedures for all biological sampling including vegetation for mercury and/or pesticide analysis are specified in the following SOPs:

- *Fish and Feather Sample Archiving* (SFWMD-FIELD-SOP-005)

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- *Mercury and other Toxicants in Fish* (SFWMD-FIELD-SOP-006)
- *Mercury in Birds* (SFWMD-FIELD-SOP-010)
- *Blue–Green Algae Reporting* (SFWMD-FIELD-SOP-019)
- *Line Intercept Macrophyte Survey* (SFWMD-FIELD-SOP-024)

Protocols for the collection of tissues for non-mercury and/or pesticide analyses may be project-specific are specified in the appropriate operational monitoring plan and/or SOP.

4.7 Microbiological Sample Collection

Collection and sample processing procedures for collecting microbiological samples are found within FDEP SOP FS2000. Microbiological containers must be either purchased pre-sterilized from a commercial vendor or sterilized following Table FC1000-2 in the FDEP-SOP-001/01.

4.8 Trace Metals and Ultra-Trace Mercury Sample Collection Using Clean Hands/Dirty Hands (CH/DH)

The collection of ultra-trace level total and methyl mercury samples and trace level metal samples in surface water by the District follows a modified version of the CH/DH technique as specified in the FDEP SOP 001/01 Section FS8200 and *USEPA Method 1669: Sampling Ambient Water for Trace Metals at USEPA Water Quality Criteria Levels*. Details of the CH/DH protocol used by SFWMD WQMS can be found in the current version of the *Mercury in Surface Water SOP* (SFWMD-FIELD-SOP-008).

4.9 Marsh Sampling

Specific requirements for collecting surface water samples in a marsh environment are described in the *Surface Water Quality Sampling in Marshes SOP* (SFWMD-FIELD-SOP-004). Sediment samples collected from a marsh environment must be collected in accordance with Section 4.4 of the FSM. A detailed list of MDL and PQL requirements for WQMS projects is included in Appendix 6.

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Table 9 Hold Time and Preservation for Surface Water[1]

Bottle Label Color[18]	Analyte	Preservative	Preservation Code[8]	Container Size (mL); Material	Holding Time
Beige (BE)	Laboratory pH (LPH)	> 0°C & ≤ 6°C	4C	120 - 1 analyte 250 - 2 analytes 500 - >2 analytes Plastic	Immediate
	Laboratory Specific Conductance (LCOND)				28 Days
	Turbidity (TURB)				48 Hours
	Alkalinity (ALKA)				14 Days
	Alkaline Phosphatase Activity (APA)				4 days[3]
	Total Dissolved Solids (TDS)				7 Days
White (W)	Total Suspended Solids (TSS)	> 0°C &≤ 6°C	4C	1000; Plastic	7 Days
	Volatile Suspended Solids (VSS)				
	Low level TSS			2000; Plastic	
Orange (OR)[12]	Color (COLOR)	Field Filter > 0°C & ≤ 6°C	4C, F	125; Plastic 60; Plastic[4]	48 Hours
	Orthophosphate (OPO4)				
	Nitrite (NO2)				
	Silica (SIO2)				28 Days
	Sulfates (SO4)				
	Chlorides[2] (CL)	Field Filter	F		
Yellow (YE)	Carotenoids (CARO)	> 0°C & ≤ 6°C	4C, D	1000; Opaque (dark) Plastic[11]	48 Hours to Filter, 28 Days[5] to extract and analyze
	Chlorophylls (CHL-N)[11]				
	Pheophytin (PHEO)				

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Bottle Label Color[18]	Analyte		Preservative	Preservation Code[8]	Container Size (mL); Material	Holding Time
Magenta (MA)	Total Nitrogen (TN)		> 0°C & ≤ 6°C Sulfuric Acid to 1.3 < pH < 2	4C, SA	60 - 1 analyte[10] 120 - ≤ 2 analytes 250 -≥ 3 analytes Plastic	28 Days
	Total Phosphorus (TPO4)					
	Total Organic Carbon (TOC)					
Light Blue (LB)[12]	Dissolved Phosphorus (TDPO4)		Field Filter Sulfuric Acid to 1.3 < pH < 2 > 0°C & ≤ 6°C	4C, SA, F	60 - 1 analyte[10] 120 - ≤ 2 analytes 250 - ≥ 3 analytes Plastic	28 Days
Light Blue (LB)[12]	Total Dissolved Nitrogen (TDN)					
	Dissolved Organic Carbon (DOC)					
Grey (GY)[12]	Nitrate-Nitrite (NOX)		Field Filter Sulfuric Acid 1.3 < pH < 2 > 0°C & ≤ 6°C	4C, SA, F	60; Plastic	28 Days
	Ammonia (NH4)					
Bright Blue (Total Metals) (BB)	Aluminum (TOTAL)		Nitric Acid to 1.3 < pH < 2[7]	NA	250; Nalgene Plastic	6 Months
	Arsenic[17] (TOTAS)	Nickel[17] (TOTNI)				
	Barium[17] (TOTBA)	Lead[17] (TOTPB)				
	Beryllium[17] (TOTBE)	Selenium[17] (TOTSE)				
	Cadmium[17] (TOTCD)	Magnesium (MG)				
	Chromium (TOTCR)	Zinc (TOTZN)				
	Copper (TOTCU)	Calcium (TOTCA)				
	Iron (TOTFE)	Strontium (TOTSR)				
	Silver[17] (TOTAG)					
Green (Dissolved	Aluminum (TDSAL)		Field Filter[7]	NA, F	250; Nalgene Plastic[6]	6 Months

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Bottle Label Color[18]	Analyte		Preservative	Preservation Code[8]	Container Size (mL); Material	Holding Time
Metals) (GR)[12]	Arsenic[17] (TDSAS)	Nickel[17] (TDSNI)	Nitric Acid to 1.3 < pH < 2		60; Plastic	
	Barium[17] (TDSBA)	Lead[17] (TDSPB)				
	Beryllium[17] (TDSBE)	Selenium[17] (TDSSE)				
	Cadmium[17] (TDSCD)	Zinc (TDSZN)				
	Chromium (TDSCR)	Iron (TDSFE)				
	Copper (TDSCU)	Silver[17] (TDSAG)				
Green (Dissolved Metals) (GR)12	Calcium (CA)	Strontium (TDSSR)	Field Filter[7] Nitric Acid to 1.3 < pH < 2	NA, F	250; Nalgene Plastic[6] 60; Plastic	6 Months
	Magnesium (MG)	Sodium (NA)				
	Potassium (K)					
Brown (BR)	Microcystin (MICRO)		> 0°C & ≤ 6°C	4C	124; Glass	7 Days
Red	Algal Toxins[20]		Cool, ≤ 6°C	4C	250; Amber Glass	7 Days
Red (Pesticides)	Chlorinated (phenoxy acid) Herbicides and Urea Herbicides[19]		Cool, ≤ 6°C	4C	500 mL; Brown glass	7 days until extraction, 40 days after extraction
Red (Pesticides)	Organochlorine Pesticides[19]		Cool, ≤ 6°C	4C	500 mL; Brown glass 1 L; Brown glass	7 days until extraction, 40 days after extraction 28 days, 90 days for analysis
	Organophosphorus and Organonitrogen Pesticides[19]					
Red (Mercury)	Total Organic Carbon (TOC)[19]		Cool, ≤ 6°C	4C	125 mL; Plastic	
	Total Mercury[19]				125 mL; Plastic	
Red (Mercury)	MeHg[19]		Hydrochloric Acid to 1.3 < pH < 2	HCL	250 mL; Plastic, pre-preserved	48 hours, 6 months for analysis

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Bottle Label Color[18]	Analyte	Preservative	Preservation Code[8]	Container Size (mL); Material	Holding Time
		Ship at 0-4°C and dark immediately			

1. Containers used by the District laboratory; table developed from 40 CFR Part 136. Other bottle sizes should be used as requested by outside laboratories. All emergency samples are collected using the largest bottle size.
2. Cooling to 4ºC is not necessary for chlorides.
3. According to the District method.
4. A 120 mL or 60 mL plastic bottle may be used if collecting orthophosphate and/or nitrite samples.
5. Holding time can be extended by filtering samples within 48 hours of collection. Analysis must be done immediately or else the filtered sample must be frozen for up to 28 days.
6. A 60 mL bottle may be used if collecting for cations (Ca, Mg, Na, Sr or K) only. This 60 mL bottle is not Nalgene.
7. Cooling to 4ºC is not necessary for nitric preserved metals/cation samples.
8. Sample preservation codes on labels: **4C** = cool sample to 4°C, **SA** = preserve sample with Sulfuric Acid, **NA** = preserve sample with Nitric Acid, **F** = Filter sample, **D** = sample bottle must be kept in the dark.
9. A white label is used for Mercury in Biological Tissues archived samples. These samples must be double-bagged and stored in a freezer at -20°C.
10. A 60 mL bottle may be used for marsh sample collection when the water depth is ≤ 20 cm.
11. Chlorophyll samples may be collected in either an opaque or transparent Van Dorn, provided the sample is then expeditiously transferred into an opaque bottle. Refer to individual monitoring plans for project specific chlorophyll (CHL-N) sample collection procedures.
12. Field filter pore size must be 0.45 microns.
13. Freeze dried or dried at 60 degrees Celsius (°C) during general solids preparation step.
14. Maximum storage times for samples at wet conditions.
15. Maximum storage times for snail sample at ≤ 6 °C before freezing snail sample.
16. Maximum storage times for dried soil, sediment, plant and snail tissue samples at ambient temperature
17. This analyte is not currently analyzed by the District laboratory and the bottle type and volume are specified by the contract laboratory. Please consult the FPM to determine the appropriate bottle size requirements.
18. The label color for samples submitted to contract laboratories can be a color not identified here for the specific analyte (e.g., label could be red or black).
19. This is the analytical group for the Project Specific analytes in SFWMD MPs, see SFWMD MPs in SharePoint.
20. This is the analytical group for the Project Specific analytes in SFWMD MPs, see BGA OMP-107 in SharePoint.

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Table 10. Holding and Preservation Times for Other Matrices (Bottle label color Black [BL])

Matrix	Analyte	Preservation	Preservation Code[1]	Container Size (mL); Material	Holding Time
Metals and Organics in Fish (BFI)[3]	Total Mercury	≤ 6°C in the field; Store at < -20°C	4C	10; Plastic	6 Months
	Other Metals[2]			250; Glass	
	Total Aluminum				
	Total Copper				
	Organics[2,4]				
	General Solids				28 days
Metals, Nutrients, and Other Analytes in Sediment (SE)[3]	Total Mercury	≤ 6°C in the field	4C	250; glass jar, High grade plastic jar	1 year
	MeHg				
	Other Metals[2]				6 months
	Total Organic Carbon				
	Ash and Ash Free Dry Weight				
	Total Phosphorus				
	Total Nitrogen				
	Total Carbon				
	Total Sulfur				
	Total Calcium, Total Iron, Total Magnesium				
	Total Aluminum, Total Copper				
	Moisture Content				28 days
	Soil pH				7 days

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Matrix	Analyte	Preservation	Preservation Code[1]	Container Size (mL); Material	Holding Time
Organics in Sediment (SE)[3]	Chlorinated (phenoxy acid) Herbicides[2,4]	Cool, ≤ 6°C	4C	1 L sediment jar	14 days until extraction, 40 days after extraction
	Organochlorine Pesticides[2,4]				
	Organophosphorus and Organonitrogen Pesticides[2,4]				
	Urea Herbicides and Imidacloprid[2,4]				

1. Sample preservation codes on labels: **4C** = cool sample to ≤ 6°C
2. This analyte is not currently analyzed by the District laboratory and the bottle type and volume are specified by the contract laboratory. Please consult the FPM to determine the appropriate bottle size requirements.
3. The label color for samples submitted to contract laboratories can be a color not identified here for the specific analyte (e.g., label could be red or black).
4. This is the analytical group for the Project Specific analytes in SFWMD MPs, see SFWMD MPs in SharePoint.

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Section 5: Autosamplers

5.0 Autosamplers

The use of Autosamplers and how they are programmed to collect a water quality sample are based on project-specific requirements found in the project's operational and/or compliance monitoring plan, station facility constraints, parameters for which samples are to be collected, and how the samples are triggered (flow or time).

5.1 Deployment and Operation

Autosamplers, deployed at designated stations, are typically housed within prefabricated enclosures and equipped with a power source (hardwired or solar) and a battery. The standard non-refrigerated autosampler tub holds 24 pre-preserved, one-liter (L) discrete bottles.

Each discrete bottle deployed in the autosampler tub must be visually checked weekly for contamination (e.g., insects) and if contaminated, replaced with a new laboratory-cleaned bottle. No empty/full contaminated discrete bottle capped or uncapped should be left in the autosampler tub even as a place holder. All deployed discrete bottles must be replaced at least quarterly with new laboratory-cleaned bottles. Discrete bottles may be utilized up to 90 days from the date of laboratory cleaning if stored in a sealed, non-perforated bag. If the bag is not sealed or is perforated, the bag of bottles must be returned to the laboratory for cleaning regardless of the laboratory cleaning date. For Autosampler procedures, programming, and general guidelines refer to the *Autosampler SOP (SFWMD-FIELD-SOP-038)*.

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Section 6: Instrument Calibration and Field Measurements

6.0 Field Testing

This section outlines the procedures for using field instruments to measure ambient physiochemical properties for parameters that are measured in real-time (i.e., in situ grab), typically at the time of sample collection, or via field instruments that are continuously deployed and unattended for extended periods of time. These field parameters include pH, specific conductance, salinity, dissolved oxygen (DO), temperature, and if applicable dissolved oxygen percent saturation (DO%). The data in this section, collected in conjunction with grab samples, are validated by the WQMS QA team in accordance with the *Quality Assessment of Field Data SOP* (SFWMD-FIELD-SOP-002). The procedures for instrument deployment are specified in the *Sonde Deployment and Data Retrieval* SOP (SFWMD-FIELD-SOP-013) and in Section 6.14 below.

It is recommended that sampling staff create a log file prior to collecting field parameters using a YSI ProDSS sonde, which are utilized for in situ grabs, and save the logged field parameters from each station. These saved data can then be transferred from the YSI ProDSS sonde to the field computer, and then saved to the WQM Data Dropbox folder. If necessary, these data will then be traceable and can be utilized if there is a correction required. Instructions for creating a log file can be found in Appendix 2.

Other parameters measured in the field include total depth, sampling depth, and Secchi disk depth.

6.1 Calibration Definitions and Requirements

Collectors must verify that equipment is in proper working condition, calibrated, and that any necessary batteries are properly charged. Initial calibration and verification values defined below must be within calibration acceptance criteria (specified in Table 11).

Initial Calibration (IC): The field instrument must be adjusted (manually or automatically) to a theoretical value (e.g., DO saturation) or a known value of a calibration standard. If an initial calibration fails to meet the acceptance criterion during initial calibration, the instrument must be removed from service.

Initial Calibration Verification (ICV): The initial calibration of the field instrument must be immediately verified by measuring a calibration standard of known value as if it were a sample and comparing the measured result to the calibration acceptance criteria. Standards used for all calibrations and calibration verifications must be discarded after use.

Each field instrument must be calibrated and verified daily prior to use.

Continuing Calibration Verification (CCV): The CCV verifies that the field instrument is holding its calibration. It is performed after actual field testing has commenced by measuring a calibration standard of known value as if it were a sample and comparing the measured result

to the calibration acceptance criteria. The CCV must be verified at the end of the sampling trip or within 24 hours after the initial calibration, whichever is less.

Quantitative Calibration Bracket: The field instrument must be calibrated and verified at two known values, which include the range of environmental sample measurements for a particular trip. Test results for the samples must be quantitatively bracketed between these two standard values.

Acceptance Criteria: The acceptance criteria are the numerical limits within which calibration verifications are acceptable.

Expiration Date: The expiration date is the date after which a standard may not be used for calibration or calibration verification (e.g., a standard with the expiration of June 2024 is used through June 30, 2024, but must not be used on July 1, 2024). Standards that are past their expiration date must be discarded.

6.2 Instrument Measurement Requirements

The following outlines specific procedures for in situ measurements of field parameters (Summarized in Table 12):

- The manufacturer's instructions for sample measurement must be followed using the specific multi-parameter unit.
- All field parameters must have an indication of pass or fail for each value verified.
- The probe must be rinsed with AFW after each calibration, verification of each standard solution/buffer or use at a sampling station.
- The probe must be placed into a container with tap water for transportation.
- The probe must be immersed at the desired water depth (i.e., recorded sampling depth unless otherwise noted) and allowed to stabilize before recording the field measurements.
- The probe must be placed at the same depth the sample is collected. Any deviation from this protocol must be recorded in the comment section of the COC.
- The values read from the field instrument ***must not be rounded*** or truncated; they must be recorded as they appear on the instrument display.
- If DO and/or salinity data are collected, specific conductance must be calibrated, and temperature verified.
- If pH and/or specific conductance data are collected, temperature must be verified.
- A separate set of readings is required for each replicate sample (RS) recorded on the Field Test Report (FTR). Depth profile field measurements (FP) are not duplicated with the readings recorded for the grab sample.
- For groundwater readings to assess purging criteria, the probe must not be allowed to sit in direct sunlight. The sunlight hitting the temperature probe will affect the readings of all parameters except turbidity.
- Field instruments used must meet the minimum accuracy requirements specified in Table 11 below.

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Table 11. Field Instrument Minimum Accuracy Requirements

Component	Matrix	Analytical Method	Reporting Units	Accuracy*
pH	SW, GW	SM4500H$^+$ B	pH units	± 0.2 pH units
Dissolved Oxygen (DO)	SW, GW	SM4500-O G	mg/L	± 0.2 mg/L of saturation chart at temp
Dissolved Oxygen % saturation	SW, GW	SM4500-O G	%	± 1% of the reading or 1% saturation, whichever is greater
Specific conductance	SW, GW	SM2510B	µS/cm	± 5% of the true value of the KCl standard
Temperature	SW, GW	SM2550B	ºC	± 0.2 ºC
Salinity	SW, GW	SM2520B	PSU	NA**
Secchi depth	SW	FT 1700	meters	0.1m
PAR	SW	FT 1700	µmoles/m^{2}s	NA
Turbidity	SW, GW	FT 1600	NTU	NA

SW= Surface Water
GW= Groundwater
* The accuracy objectives are not the same as the calibration and verification acceptance criteria listed in Table 12 and in the parameter specific sections.
** Salinity is calculated in the instrument using conductance and temperature. The instrument must therefore have the minimum accuracy stated for specific conductance.

Table 12. Specific Probe Calibration and Verification Requirements Quick Reference *

Parameter	Acceptance Criteria
pH (FT 1100)	± 0.2 Standard pH Units of buffer
Specific Conductance (FT 1200)	± 5% of standard value
Temperature (FT 1400)	± 0.5°C of NIST-traceable value Verification over range of applicable values
Dissolved Oxygen (FT 1500)	± 0.3 mg/L of theoretical value

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Parameter	Initial Calibration (IC)	Initial Calibration Verification (ICV)	Continuing Calibration Verification (CCV)
Specific Conductance	• Daily prior to use • 1 standard at the upper end of expected sample reading range, but no less than 720 µS/cm • Must be within ± 5% of True Value	• Read after calibration is complete • 1 standard at the low end of expected sample reading range, but no less than 100 µS/cm • Must be within ± 5% of True Value	• Two standards that bracket the sample value range within ± 5% of True Value • If any sample values are less than 100 µS/cm, the 100 µS/cm standard is read for the CCV • Verified at the end of the trip, or within 24 hrs after IC, whichever is less
pH	• Daily prior to use • ***pH 7 must be used first*** • A minimum of 2 standards: pH 7 and either 4 or 10 • The calibrated reading must read within ± 0.2 standard pH units of calibration buffer's True Value	• This is read and entered after each buffer is calibrated. The reading recorded for the last buffer calibrated is the ICV for pH.	• Two buffers that bracket the sample value range, preferably one is pH 7 • The instrument must read within ± 0.2 standard pH units of calibration buffer's True Value • Verified at the end of the trip, or within 24 hours after IC, whichever is less
DO	• Daily prior to use • Read under water-saturated atmosphere • Reading must be within ± 0.3 mg/L of expected soluble oxygen value at water temperature	• Read after calibration is complete. The reading recorded for the IC is also the ICV for DO.	• Read under water-saturated atmosphere • Reading must be within ± 0.3 mg/L of expected soluble oxygen value at water temperature • Verified at the end of the trip, or within 24 hrs after IC, whichever is less

Temperature			• Quarterly verification (against NIST-traceable thermometer) in ambient temperature water
			• Annual (i.e., once every 12 months) verification (against NIST-traceable thermometer)
			  ○ Level 1: < 15 ºC,
			  ○ Level 2: 35 ºC - 45 ºC,
			  ○ ambient temperature water
			• Must be within ± 0.5ºC of NIST-traceable readings

* For specific probe calibrations and verification requirements for Deployed Sondes see the *Sonde Deployment and Data Retrieval SOP* (SFWMD-FIELD-SOP-013).

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6.3 Instrument Failure

6.3.1 Acceptance Criteria Failure

If verification fails to meet the acceptance criterion at the ***end of a sampling trip***, it must be recorded in the Trip Comments section of the OCS or handwritten onto the FTR, along with identifying which parameter failed and all corrective actions planned or taken with the instrument.

6.3.2 Instrument Malfunction in the Field

If the instrument malfunctions ***during the sampling trip in the field***, the following steps must be performed. The necessity for resampling of field test data or recalibration of the same instrument or calibration of another instrument must be determined by consulting with the Field Unit Supervisor:

- When instrument readings are suspect while in the field, a CCV may be performed. If performed, the following applies:
    - If the instrument passes the CCV, this check and the location are recorded, and the instrument may continue to be used.
    - If the instrument does not pass the CCV, the instrument's failure must be recorded in the COC noting the station where the failure occurred. Comments must indicate what parameter failed and whether a new instrument was calibrated.
- If a different instrument is calibrated, thus removing the original calibration values in HFDM, then the following must be transcribed onto the Failed Instrument FTR (Water Quality Monitoring – WQM Controlled Documents\FSM-QM\Logbook Forms_Other Forms\Instrument Failure_Field Test Report) (Figure 2):
    - The "failed" instrument identification,
    - The original "failed" instrument's IC/ICV field test data with corresponding time(s),
    - The CCV,
    - The location where the instrument failed, and
    - The ICV and CCV solution set identifications of the "failed" instrument.
- Calibrate the new instrument after the "failed" instrument calibration values and timestamps have been transcribed into the FTR form. The calibration values must be entered into HFDM with corresponding new time(s) replacing the calibration values and time stamps of the "failed" instrument.
- If deemed necessary, all stations where the failed instrument was used may be revisited and field data recollected. Recollected data must be entered into HFDM with corresponding new time(s) (replacing the data of the "failed" instrument).
- Field Test results from stations associated with a failed instrument calibration will be qualified unless they are recollected.

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- When using paper records (not HFDM) all original calibrations and field testing data that are recollected are treated as corrections on the FTR.
- All records including the FTR failure spreadsheet must be turned into the laboratory during sample submission.
- ***The WQMS QA Team must be notified of the instrument failure within 24 hours.***

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

FAILED INSTRUMENT -- FIELD TEST REPORT

SAMPLE ANALYST: _____ IC / ICV LOCATION: _____
IC / ICV ANALYST: _____ IC / ICV SOLUTION SET ID: _____
CCV ANALYST: _____ CCV LOCATION: _____
INTRUMENT ID# : _____ CCV SOLUTION SET ID: _____

FIELD SAMPLE ID	TVALUE	PreCal Reading (IC's only)	Sp Conductance (uS/cm)	Dissolved Oxygen (mg/L)	pH	Temperature (Degree C)	Salinity (ppt)	Redox (mv)	Date/ Time Analyzed	P / F
IC 1 (COND)										
IC 2 (COND)										
ICV 1 (COND)										
IC 1 (pH)										
IC 2 (pH)										
IC 3 (pH)										
IC 1 (DO)										
CCV 1 (COND)										
CCV 2 (COND)										
CCV 1 (pH)										
CCV 2 (pH)										
CCV 1 (DO)										

SIGNATURE: _____ REVIEWED BY: _____
DATE: _____ DATE: _____

Acceptance Criteria	
DO	+/- 0.3 mg/L
Sp. Cond	+/- 5 percent
pH	+/- 0.2 pH units

Figure 2. Failed Instrument Field Test Report Form

6.4 Instrument Calibration

General Guidelines

- Instrument operation is detailed in the instrument's SOP or the manufacturer's calibration instructions.

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- All IC/ICV and CCV information should be recorded within the Opening and Closing Controls section of HFDM. If HFDM is unavailable for use, the information may be recorded within a Field Test Report. When using the FTR there is no need to include a Date/Time Analyzed for the P-numbers for the OCS and the CCS, the IC/ICV and CCV, have their own Date/Time Analyzed cells. If a multi-parameter instrument is to be used the recommended calibration order is:
    - Specific conductance,
    - pH, then
    - DO.
- For DO membrane probes, the membrane must be checked prior to the probe being re-calibrated (See 6.8.1 DO IC for more information)
- The pre-calibration value should be within the acceptance criterion of the true value. If the instrument pre-calibration value is not within the acceptance criterion of the true value of the standard or buffer, the calibration cup must be rinsed, refilled with the standard solution and the instrument allowed to stabilize prior to recalibration.
- Possible reasons why the instrument may not read close to the expected value include:
    - The instrument may not have been calibrated since its last maintenance event,
    - The instrument probe(s) may need maintenance,
    - The instrument could have been calibrated with a different standard (e.g., 20,000 µS/cm vs. 720 µS/cm conductance standard),
    - The instrument was previously calibrated improperly and/or
    - The instrument may need to be serviced at an authorized repair facility.
    - If none of the possible reasons above of why the instrument is still not within the acceptance criteria, the instrument needs to be inspected and another instrument should be used.

6.5 Specific Conductance – Calibration

6.5.1 Standards

For field instruments, commercially purchased standard potassium chloride (KCl) solutions must be used. AFW is not a standard.

6.5.2 Specific Conductance IC

- The standard KCl solutions used for the calibration and initial calibration verifications must bracket the range of expected conductance values for the sampling trip.
- The standard chosen for the specific conductance calibration must be greater than the highest expected value for the sampling trip, but not < 720 µS/cm.

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- The probes must be rinsed with the standard KCl solution prior to calibration. After calibration, the probes must be rinsed with AFW prior to using the next standard KCl solution to perform the ICV.
- For an acceptable calibration, the instrument must read within ± 5% of the true value of the calibration standard. If it does not, another multi-parameter instrument must be used.

6.5.3 Specific Conductance ICV

After the initial calibration, the instrument must be verified with at least one KCl standard. The specific conductance must be less than the range of expected conductance values measured in environmental samples for the sampling trip.

- When the sample measurements are expected to be > 100 µS/cm, a standard KCl solution must be used that brackets the range of expected sample conductivities.
- When the sample measurements are expected to be < 100 µS/cm, the 100 µS/cm standard must be used for the ICV.
- The probes must be rinsed with the KCl standard solution prior to calibration verification. After calibration verification, the probes must be rinsed with AFW prior to using the next standard solution for calibration.
- The reading for the ICV must be within ± 5% of the standard value. If it does not, another multi-parameter instrument must be used.

6.5.4 Specific Conductance CCV

- At the end of the trip or within 24 hours of the initial calibration, whichever is less, the conductance calibration must be verified by reading (***not recalibrating***) two standards that bracket all results with acceptable verification readings.
- The reading for the CCV must also be within ± 5% of the standard value.
- The probes must be rinsed with the KCl standard solution prior to continuing calibration verification. After verification, the probes must be rinsed with AFW prior to using the next standard solution for verification.
- If any sample values are less than the 100 µS/cm standard, the 100 µS/cm standard must be read for the lower standard CCV.

6.6 Salinity

The conductivity method is used to determine the salinity for WQMS projects. The specific conductance probe must be calibrated with the appropriate KCl standard solution in accordance with the manufacturer's specifications. The salinity results are read directly from the instrument and recorded on the FTR.

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6.7 pH – Calibration

6.7.1 Standards

For field instruments, commercially purchased standard buffer solutions of pH values that bracket the expected sample pH range must be used. Buffers with values of 4.0, 7.0 and 10.0 units are adequate for most situations.

6.7.2 pH IC

- The standard buffers used should include the range of expected sample pH values for the sampling trip.
- The instrument must be calibrated with at least two buffers with a ***pH 7 buffer always used first***. The second buffer must be at least three pH units greater than or less than pH 7 (i.e., pH 4 or 10).
- The probes must be rinsed with the standard buffer solution prior to calibration. After calibration, the probes must be rinsed with AFW prior to using the next standard buffer solution to calibrate.
- For an acceptable calibration, the instrument must read within ± 0.2 pH units of the true value of each calibration standard. If it does not, another multi-parameter instrument must be used.

6.7.3 pH ICV

- The ICV for pH is a reading of the pH value after the instrument has been calibrated.
- The requirement for the ICV is satisfied by the value recorded for the last buffer calibrated for pH.

6.7.4 pH CCV

- At the end of the trip and within 24 hours of the initial calibration, whichever is less, the pH calibration must be verified by reading (***not recalibrating***) two buffers that bracket the range of values measured during the sampling trip.
- It is recommended that the pH 7 buffer be one of the buffers read unless the range of sample values is both greater and less than pH 7.
- The probes must be rinsed with the standard buffer solution prior to continuing calibration verification. After verification, the probes must be rinsed with AFW prior to using the next standard solution for verification.
- The instrument must read within ± 0.2 standard pH units of the calibration buffer's True Value.

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6.8 Dissolved Oxygen (DO) – Calibration

DO probes utilized by WQMS include luminescence-based optical (LDO) dissolved oxygen probes. The narrative below identifies steps specific to each probe type.

6.8.1 DO IC

- Luminescence-based: The probe cap must be checked before calibrating a Luminescence-based DO (LDO) sensor probe. Refer to the instrument manual for calibration, use and maintenance requirements of the specific sensor being used.
    - For YSI ProDSS sensors and similar: There must be no water droplets on the ODO sensor cap or temperature sensor. The sensors must be wiped with a Kim wipe to remove water droplets, if present.
- If DO will be measured during a sampling trip, specific conductance must be calibrated and verified, and temperature must be verified quarterly, even if specific conductance and/or temperature are not recorded during the trip.
- The water in the calibration cup should be the same temperature as the area in which the calibration is being performed (ambient temperature).
- If a DO calibration is performed outside, it must be done in the shade.
- DO is calibrated in the % saturation mode and the DO value in mg/L is used to assess the acceptance or rejection based on the criterion of +/- 0.3 mg/L.
- The temperature entered onto the HFDM/FTR must be the reading recorded at the time of DO calibration.
- For an acceptable calibration, the multi-parameter instrument must read within ± 0.3 mg/L of the saturation value as shown in Table 13. If it does not, another multi-parameter instrument must be used.
    - When verifying the true value for DO on the Dissolved Oxygen Saturation Chart (Table 13), the temperature must be rounded to the nearest tenth place value (i.e., 0.1).
        - A **6**, **7**, **8**, or **9** should be rounded up (i.e., 24.**37** is 24.**4**) and
        - A **1**, **2**, **3**, or **4** should be rounded down (i.e., 24.**34** is 24.**3**).
    - However, for a **'5'** the 'unbiased rounding rule' applies:
        - A **5** next to an odd number should be rounded up (i.e., 22.**55** is 22.**6**) and
        - A **5** next to an even number should be rounded down (i.e., 27.**25** is 27.**2**).
    - The temperature must be recorded to the hundredth place value (0.01) in the HFDM/FTR and the unbiased rounding rule is used to verify the True Value of DO on Table 13.

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6.8.2 DO ICV

- The ICV for DO is performed after the instrument has been calibrated according to the instrument manual of the instrument used.
- The requirement for the ICV is satisfied by the value recorded for the DO calibration.

6.8.3 DO CCV

- At the end of a trip, or within 24 hours (whichever is shortest) of the IC, the DO calibration must be verified (***not recalibrated***) by reading DO in saturated air.
- The value must be within ± 0.3 mg/L of the saturated value in Table 13.

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Table 13. Dissolved Oxygen (DO) Saturation

TEMP ^{0}C	D.O. SAT.	TEMP ^{0}C	D.O. SAT.	TEMP ^{0}C	D.O. SAT.	TEMP ^{0}C	D.O. SAT.
15.0	10.084	19.0	9.276	23.0	8.578	27.0	7.968
15.1	10.062	19.1	9.258	23.1	8.562	27.1	7.954
15.2	10.040	19.2	9.239	23.2	8.546	27.2	7.940
15.3	10.019	19.3	9.220	23.3	8.530	27.3	7.926
15.4	9.997	19.4	9.202	23.4	8.514	27.4	7.912
15.5	9.976	19.5	9.184	23.5	8.498	27.5	7.898
15.6	9.955	19.6	9.165	23.6	8.482	27.6	7.884
15.7	9.934	19.7	9.147	23.7	8.466	27.7	7.870
15.8	9.912	19.8	9.129	23.8	8.450	27.8	7.856
15.9	9.891	19.9	9.111	23.9	8.434	27.9	7.842
16.0	9.870	20.0	9.092	24.0	8.418	28.0	7.828
16.1	9.849	20.1	9.074	24.1	8.403	28.1	7.814
16.2	9.829	20.2	9.056	24.2	8.387	28.2	7.800
16.3	9.808	20.3	9.039	24.3	8.371	28.3	7.786
16.4	9.787	20.4	9.021	24.4	8.356	28.4	7.773
16.5	9.767	20.5	9.003	24.5	8.340	28.5	7.759
16.6	9.746	20.6	8.985	24.6	8.325	28.6	7.745
16.7	9.726	20.7	8.968	24.7	8.309	28.7	7.732
16.8	9.705	20.8	8.950	24.8	8.294	28.8	7.718
16.9	9.685	20.9	8.932	24.9	8.279	28.9	7.705
17.0	9.665	21.0	8.915	25.0	8.263	29.0	7.691
17.1	9.645	21.1	8.898	25.1	8.248	29.1	7.678
17.2	9.625	21.2	8.880	25.2	8.233	29.2	7.664
17.3	9.605	21.3	8.863	25.3	8.218	29.3	7.651
17.4	9.585	21.4	8.846	25.4	8.203	29.4	7.638
17.5	9.565	21.5	8.829	25.5	8.188	29.5	7.625
17.6	9.545	21.6	8.812	25.6	8.173	29.6	7.611
17.7	9.526	21.7	8.794	25.7	8.158	29.7	7.598
17.8	9.506	21.8	8.777	25.8	8.143	29.8	7.585
17.9	9.486	21.9	8.761	25.9	8.128	29.9	7.572
18.0	9.467	22.0	8.744	26.0	8.114	30.0	7.559
18.1	9.448	22.1	8.727	26.1	8.099	30.1	7.546
18.2	9.428	22.2	8.710	26.2	8.084	30.2	7.533
18.3	9.409	22.3	8.693	26.3	8.070	30.3	7.520
18.4	9.390	22.4	8.677	26.4	8.055	30.4	7.507
18.5	9.371	22.5	8.660	26.5	8.040	30.5	7.494
18.6	9.352	22.6	8.644	26.6	8.026	30.6	7.481
18.7	9.333	22.7	8.627	26.7	8.012	30.7	7.468
18.8	9.314	22.8	8.611	26.8	7.997	30.8	7.456
18.9	9.295	22.9	8.595	26.9	7.983	30.9	7.443

***See Appendix 10 for guidance on temperatures exceeding listed values.**

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6.9 Field Waste Disposal

Calibration standard waste generated from field verifications must be containerized for disposal into the sanitary sewer at the base of operations.

6.10 Temperature

6.10.1 Standards

An instrument's temperature probe must read accurately in order to ensure the accuracy of the DO, specific conductivity, and pH readings. The temperature readings must be verified by a comparison to readings obtained using a NIST-traceable thermometer with a resolution of 0.1°C and a range of 0°C to 100°C. The NIST traceable thermometers used for the temperature verification on field instruments must be certified or replaced by the calibration due date stated on the calibration certificate. If there is no due date stated on the calibration certificate, the NIST traceable thermometer must be recertified or replaced one year from the calibration date.

6.10.2 Calibration Verification

Temperature probe verifications are essential for accurate data collection and verification failures can result in qualifying data, which can be consequential. The temperature probes on the multi-parameter instruments used by the District cannot be calibrated by the user. They must be calibrated professionally. If a multi-parameter instrument fails the temperature check either the probe or the instrument, depending on the manufacturer, must be sent to an authorized repair facility for calibration. Temperature verifications must be recorded in the Data sonde Maintenance eForm. **A temperature probe failure must be reported directly to the WQMS QA Team as soon as possible** prior to taking the sonde from the water bath and prior to changing the probe and/or sending the instrument out for maintenance/repair. **If at all possible, when at the FOC, a member of the QA Team must be notified while the sonde is still in the water bath so the QA Team member can verify the sonde verification process is valid and the failure can be replicated. If at all possible, when at the Okeechobee Field Station, a member of the QA Team and the field unit supervisor must be notified while the sonde is still in the water bath so the QA Team member and field unit supervisor can verify the sonde verification process is valid and the failure can be replicated.** The intent is for inconsistencies in the temperature verification process to be identified before it is recorded. If the assessment by the QAO or the WQMS QA Team determines the procedure is the problem and not the sonde, then we avoid qualifying the temperature data unnecessarily. The QAO or the WQMS QA Team must verify all multi-parameter instrument failures because of the amount of data that **may be** qualified based on this type of failure. Sondes that fail must be delivered to the WQMS QA Team for verification of the failure.

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6.10.2.1 Quarterly Calibration Check

The temperature for each instrument must be checked at least quarterly in ambient temperature water against a NIST traceable thermometer and the information recorded in the Sonde Maintenance Form.

The temperature verification is accepted if the instrument reads within ± 0.5 °C of the NIST traceable thermometer or else the probe must be checked in a controlled temperature water bath. If the instrument does not agree with the NIST traceable thermometer, refer to 6.10.2 above.

6.10.2.2 Annual Multi-Temperature Verification

Each multi-parameter instrument must be checked on an annual (i.e., once every 12 months) basis to verify that it reads both high and low temperature ranges. The low temperature verification must be performed with a cold-water bath less than 15 °C and the high temperature must be performed with a hot water bath within a range of 35 °C – 45 °C. Do not exceed the max temperature specification for the sensor (e.g., YSI is 50 °C). Additionally, the ambient temperature verification must be performed, and the information recorded in the Sonde Maintenance Form.

The temperature verification is accepted if the instrument reads within ± 0.5 °C of the NIST traceable thermometer. If the instrument does not agree with the NIST traceable thermometer, refer to 6.10.2 above.

- New multi-parameter instruments or replaced temperature / conductivity probes must be checked for high, low and ambient temperatures before they are used, prior to being sent for service at an authorized repair facility, and/or returned from service (internal or external).
- When pH or DO probes are replaced an ambient temperature verification must be completed before multi-parameter instrument is utilized.
- When an instrument is retired, it must be checked for high, low and ambient temperatures before it is retired.

6.11 Turbidity

Field turbidity readings are usually taken for groundwater collection projects. Requirements are specified in the FDEP SOP FT1600. Measurements of non-nephelometric turbidity using *in situ* probes are acceptable for screening purposes only (e.g., groundwater purge stabilization measurements) and must be qualified with an "H" qualifier if entered into any database. If the 'H' qualifier is not available in the database which the data are being stored, the 'J' qualifier must be used. If the instrument is also not calibrated or verified and/or the calibration and/or verification is not recorded, the data also receive 'J5' qualifier. For either qualifier, the appropriate comment must be added (e.g., This result was obtained from an in unapproved, in situ probe method and is only an estimate of the concentration of the analyte; Instrument not recorded as having been

calibrated and/or verified). If turbidity is a required analysis for the project, a sample is collected and submitted to the laboratory where it is analyzed using the NELAP certified analysis for nephelometric turbidity. Specific procedure of using/calibrating Turbidity sensors that can be installed on multi-parameter is also available in SFWMD-FIELD-SOP-013.

6.12 Optical Sensors for Photoreactive Pigment Determinations

Sensors have been developed for in situ observation of photoreactive pigments such as chlorophyll and phycocyanin. These sensors are available on multiparameter instruments such as YSI sondes and can be measured for both grab and continuous monitoring applications.

While the results of these in situ, optical measurements may be used for observing trends or obtaining an estimate of the relative amount of the photoreactive pigment in the environment, these probes undergo a calibration or calibration verification process and therefore are not traceable to a standard. The results are also not as accurate as certified, laboratory extractive analyses. Therefore, results obtained from these sensors must be qualified with an 'H' qualifier. If the 'H' qualifier is not available in the database which the data are being stored, the 'J' qualifier must be used. For either qualifier, the appropriate comment must be added (e.g., "This result was obtained from an unapproved, in situ probe method and is only an estimate of the concentration of the analyte."). Specific procedure of using/calibrating Photoreactive Pigment sensors that can be installed on multi-parameter is also available in SFWMD-FIELD-SOP-013.

6.13 Deployed Instrumentation

The procedures for instrument deployment are specified in the *Sonde Deployment and Data Retrieval SOP* (SFWMD-FIELD-SOP-013).

- All field data must be confirmed using acceptable verifications (refer to Table 11).

6.14 Field Testing Depth Profiles

Certain projects require field parameter readings at specific depths within the water column at each station (i.e., a profile). The depth intervals for the profiles are specified in the project's monitoring plan. The FTR records each discrete depth, the collect times and the values from the instrument. Depth profile field measurements (FP) are not duplicated with the field measurements recorded for the grab sample. When collecting FP profiles, the sonde measurements must not be closer than 0.25 m to the bottom and the instrument must not touch the bottom. If the field parameters are measured at the recorded total depth, the data will be qualified with a 'J' qualifier as "improper protocol". Unused P numbers for the discreet depth profiles must be cancelled. For stations where the field parameters are the only ACODES collected (e.g., TCDO, NSDS, S675) if the measurements are not collected, the P-number must be NOB. When only field measurements (FP) are collected it is not required to have a bottle count of "zero."

6.15 Secchi Disk Depth

The following procedure must be used for the determination of Secchi disk depth:

- A line marked in 0.1 m increments must be attached to the upper side of the Secchi disk (patterned side of disk).
- Sunglasses must be removed when determining Secchi disk measurements to accurately view the disk in the water without tinted or glare-reducing lenses interfering with the observation. If aboard a boat, measurements must be taken from the shaded side of the boat or with the sun at the sampler's back.
    - The Secchi disk must be slowly lowered into the water, visually observing the disk sectors.
    - The depth when the disk disappears must be observed.
    - The disk must be lowered beyond the point of disappearance and then slowly raised to the depth at which it reappears; this depth must be observed.
    - The Secchi disk depth that is recorded for the station is the mean of the two readings.
- Any conditions that might affect the accuracy of the measurement must be recorded in the field notes (e.g., "Secchi depth taken from the bridge").
- If the Secchi disk is visible on the bottom of the body of water, the letters "SOB" must be recorded in the COC comments indicating "**S**ecchi visible **O**n **B**ottom". In this instance, the ***total depth*** at the station where the measurement was taken is recorded as the Secchi disk depth value. The datum is then qualified with a 'S' qualifier in the database.

6.15.1 Secchi Disk Lines and Weighted Lines

On an annual basis, use a meter stick or a measuring tape (fiberglass or vinyl) to verify the accuracy of the incremental markings on all Secchi disk lines and weighted lines used for depth measurements. If the difference between the reference device and the individual increments on the line being verified is greater than 10% of the measurement, then the markings must be redone. On an annual basis, the total length of the line (up to the greatest anticipated depth encountered in the field) must also be verified with a meter stick or a measuring tape. If the difference between the reference device and the line being verified is greater than 10% of the measurement, then the markings must be redone.

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6.15.2 Electronic Depth Sensors on Boats

On an annual basis, electronic depth sensors on boats must be verified (CCV) against a weighted line or Secchi disk line that has previously been verified for accuracy as described in subsection 6.16.1. Verifications must also be performed for new electronic depth sensors any time that modifications, changes, or damage occurs to the instrument configuration (10 depth measurements must be taken for annual verification). Verifications must also be performed for the keel offset on new boats.
A weighted line must be used for depth measurements on borrowed boats if they have not been verified previously.
This check can be performed in a controlled environment in the lab or at a field site where there is minimal interference from wind, waves, current, or submerged aquatic vegetation. If the difference between the reference line and the electronic device is greater than 10% of the measurement, the electronic device must be serviced or adjusted according to the equipment's user's manual before it may be used for field data collection. All annual verification information must be recorded in the Annual Verification of Boat Electronic Depth Sensor Log, see Appendix 5. The information recorded must include the unique identifier (Serial Number) for the instrument being verified.

6.16 Equipment Maintenance

Regular monthly (i.e. 30 calendar days) maintenance must be performed on frequently used instrumentation (i.e., two or more times per week). Deployed instruments must be maintained after each deployment event. Field equipment maintenance frequencies are outlined in Table 14.

6.16.1 Maintenance Records

Field instrument maintenance activities must be recorded in the Datasonde Routine Maintenance eForm in accordance with the *Electronic Forms SOP* (SFWMD-FIELD-SOP-029). The following ***must be recorded*** on the maintenance form for each piece of sampling equipment listed in Tables 2 and 3:

- The instrument's unique identifier; the manufacturer's name, model number, serial number, inventory number, etc.
- Any maintenance and repair activity performed, including routine cleaning procedures and solution or parts replacement for instrument probes See the Sonde Deployment and Data Retrieval SOP (SFWMD-FIELD-SOP-013) for specifics on deployed sonde maintenance.
- The calendar date for all maintenance and/or repairs performed
- The names and signatures of personnel performing the maintenance and/or repairs
- Descriptions of any malfunctions necessitating repair or service

A Datasonde Routine Maintenance form must be filled out before a Multi-Parameter Instrument is placed in Surplus

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Additionally, all service records *must be* **maintained.** Service reports for repairs that cannot be performed by WQMS personnel must be saved as a PDF file in the folder at the link below:

\\ad\dfsroot\data\kb_wqm\QAFiles\Field Document Archive_Sonde_Service_Records

If rental equipment is used, the information recorded must include:

- Rental date(s) and
- Equipment type, model, inventory number or other description.

Table 14. Multi-Parameter Instrument Maintenance Schedule

Instrument	Specific Activity	Frequency
YSI Multi-probe Instruments[1]	pH and reference electrodes cleaned with Liquinox and soft brush, rinsed thoroughly with AFW	Monthly/ as needed
	DO caps	Monthly/ as needed
	DO sensors sanded (must use sanding disk provided by vendor)	As needed
	Luminescence-based DO sensor cap replaced	Annually / as needed
	Conductivity probe cleaned with dilute Liquinox and soft brush, rinsed thoroughly with AFW	Monthly / as needed
In-Situ Aqua Troll 100 and 200	Conductivity probe cleaned with dilute Liquinox and soft brush, rinsed thoroughly with AFW	Monthly / as needed
In-Situ Aqua Troll 600	Conductivity probe cleaned with dilute Liquinox and soft brush, rinsed thoroughly with AFW	Monthly as needed
	pH and reference electrodes cleaned with Liquinox and soft brush, rinsed thoroughly with AFW	Monthly/ as needed
	pH reference electrode refilled with 3M KCl	Quarterly / as needed
	Outside surface of DO probe cleaned with AFW	Monthly / as needed
	Luminescence-based DO sensor cap replaced	Annually / as needed
	Outside surface of turbidity probe cleaned with AFW	Monthly / as needed

NOTES:
1. Multi-parameter units deployed over a long-term must have their internal batteries changed annually or according to manufacturer's specifications. Some sonde models do not have a user replaceable internal battery.

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6.17 Standards Documentation and Storage

Specific conductance and pH standards must be dated when received. Upon opening, the standards must also be initialed and dated, then stored in a designated area.

- The manufacturer's certificates of analysis and/or records of traceability for purchased stock solutions must be filed in a notebook according to analyte or analytical category.

For WQMS however, everything is instead directly scanned and archived onto a server folder. The Invoices / Purchase Orders from Biopharm and Fisher Scientific for Conductivity Standard Solutions, pH Buffers, HCl Acid and Phosphate-free soap will list the Lot-numbers of the items purchased. Biopharm will also ship Certificates of Analysis with the standards / buffers ordered.

The Certificate of Analysis and Invoice/Purchase Orders must be archived **in the folder below:**

\\ad\dfsroot\data\kb_wqm_Certificate of Analysis_Invoice of Standards_Buffers_Acid

- The **PDF file naming** convention for the **Invoice / Purchase Orders** must be:
  Vendor_ReceivedDate(yymmdd)_location
  (e.g., FisherScientific_220814_FOC **or** Biopharm_220814_OKEE).

- The **PDF file naming** convention for the **Certificate of Analysis** must be:
  Solution_Solution number_ReceivedDate(yymmdd)__Lot-number_location
  (e.g., Conductivity_2000_220814_J2514C_OKEE **or** pH_10_220814_K2354L_FOC).

Storage specifications of standards used for instrument calibration are listed in Table 15. All standard containers must be clearly labeled with their contents, the date opened and the expiration date.

Table 15. Standards Storage

Chemical	Storage
pH Standards	The designated cabinet or storage area for standards and reagents must be located within an air-conditioned room for long-term storage. If standards are transferred into smaller containers to be transported to the field, they must be stored within polyethylene bottles labeled with the standard set ID, date filled and discarded at the end of the day.
Conductivity Standards	The designated cabinet or storage area for standards and reagents must be located within an air-conditioned room for long-term storage. If standards are transferred into smaller containers to be transported to the field, they must be stored within polyethylene bottles labeled with the standard set ID, date filled and discarded at the end of the day.

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6.17.1 Calibration Solution Logbook and Tracking Numbers

The system shown in Figure 3 must be used for tracking lot information of calibration standards in the Calibration Solution Logbook. Each sample collection group responsible for calibration standards must maintain a logbook for the facility containing:

- The description of the standard or buffer
- The vendor catalog number (per FDEP SOP FD 4100)
- Lot numbers
- Expiration dates
- Received date
- Open Date and initials

From this list, a Tracking Number (shown as "Tracking #" on the Calibration Solution Logbook form) must be assigned to the group of standards used at that time. Each time a new container of standard or buffer solution is opened, the date, initials, lot number and expiration date must be recorded, and a new Tracking Number assigned. The Tracking Number listed on calibration solutions follows a specific nomenclature where the solution intake location is listed followed by the date. For example, "FOCAmmddyy", where the date is listed as the date the solution is opened. If a Tracking Number already exists for the current date, the Tracking Number should be recopied as is. When the new container of standard or buffer solution is opened, the opened date and initials must be marked on the container with a permanent waterproof marker. Standard information in the logbook that does not change must be carried down (drawn down with arrow) until the next new container of standard or buffer solution for that column is opened. The Tracking Number must be recorded on the FTR for the sampling trip.

A new Calibration Solution Logbook is started at the beginning of each year. The last Tracking Number and associated log information for each column (LOT #, Exp. Date, and Received/Receipt Date for all open buffers and standards) from the end of the previous logbook must be transcribed into the first row of the first page of the new Calibration Solution Logbook (outlined in red).

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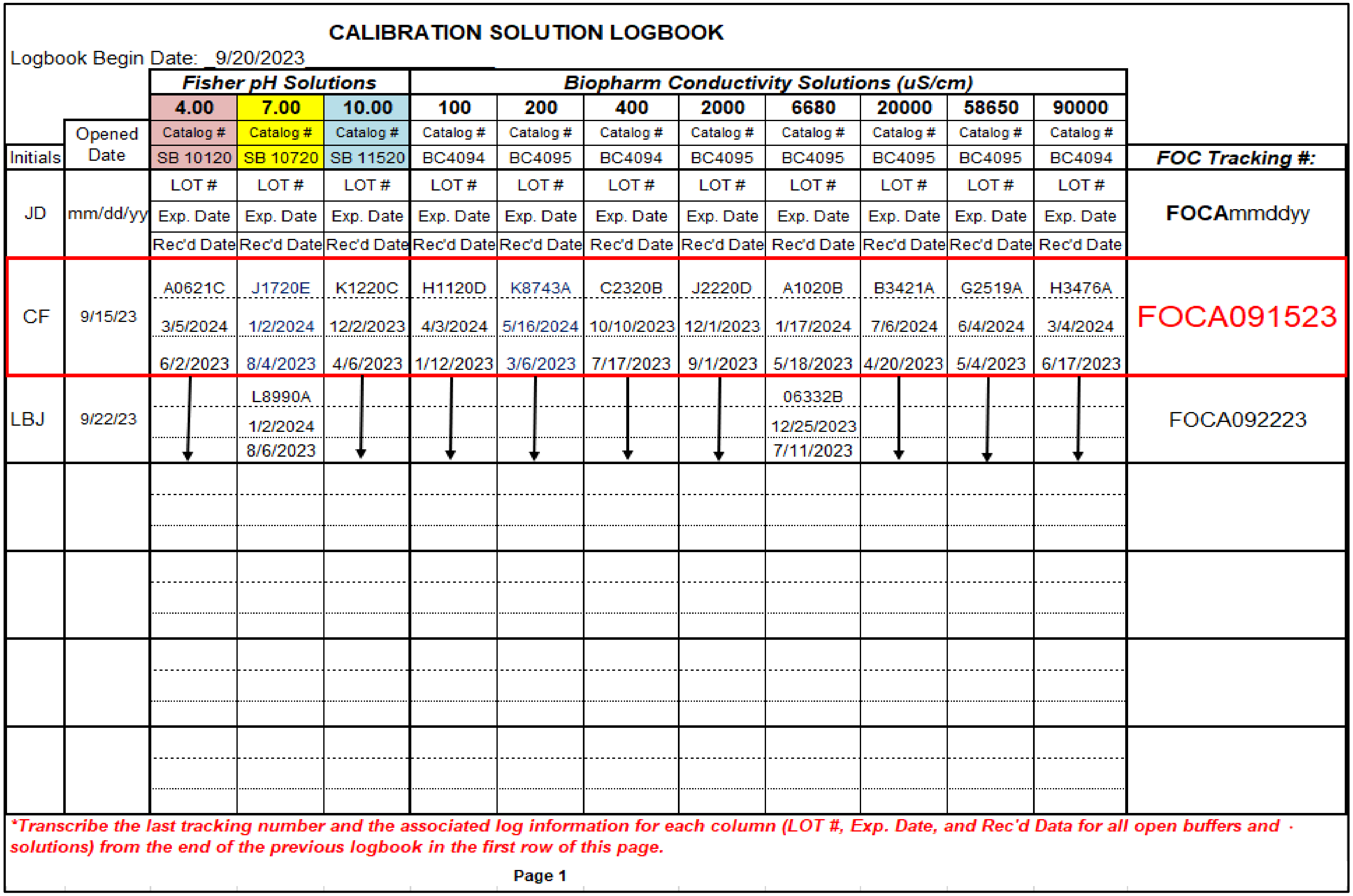

CALIBRATION SOLUTION LOGBOOK

Logbook Begin Date: 9/20/2023

		Fisher pH Solutions			***Biopharm Conductivity Solutions (uS/cm)***								
		4.00	**7.00**	**10.00**	**100**	**200**	**400**	**2000**	**6680**	**20000**	**58650**	**90000**	
	Opened Date	Catalog #	Catalog #	Catalog #	Catalog #	Catalog #	Catalog #	Catalog #	Catalog #	Catalog #	Catalog #	Catalog #	
Initials		SB 10120	SB 10720	SB 11520	BC4094	BC4095	BC4094	BC4095	BC4095	BC4095	BC4095	BC4094	***FOC Tracking #:***
JD	mm/dd/yy	LOT # Exp. Date Rec'd Date	LOT # Exp. Date Rec'd Date	LOT # Exp. Date Rec'd Date	LOT # Exp. Date Rec'd Date	LOT # Exp. Date Rec'd Date	LOT # Exp. Date Rec'd Date	LOT # Exp. Date Rec'd Date	LOT # Exp. Date Rec'd Date	LOT # Exp. Date Rec'd Date	LOT # Exp. Date Rec'd Date	LOT # Exp. Date Rec'd Date	**FOCA**mmddyy
CF	9/15/23	A0621C 3/5/2024 6/2/2023	J1720E 1/2/2024 8/4/2023	K1220C 12/2/2023 4/6/2023	H1120D 4/3/2024 1/12/2023	K8743A 5/16/2024 3/6/2023	C2320B 10/10/2023 7/17/2023	J2220D 12/1/2023 9/1/2023	A1020B 1/17/2024 5/18/2023	B3421A 7/6/2024 4/20/2023	G2519A 6/4/2024 5/4/2023	H3476A 3/4/2024 6/17/2023	FOCA091523
LBJ	9/22/23	↓	L8990A 1/2/2024 8/6/2023	↓	↓	↓	↓	↓	06332B 12/25/2023 7/11/2023	↓	↓	↓	FOCA092223

**Transcribe the last tracking number and the associated log information for each column (LOT #, Exp. Date, and Rec'd Data for all open buffers and solutions) from the end of the previous logbook in the first row of this page.*

Page 1

Figure 3. Example of Calibration Solution Logbook

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Section 7: Documentation

7.0 Documentation

Recording of the sampling event must be completed for each daily trip using standardized District forms (e.g., the Chain of Custody (COC), the Field Test Report (FTR), field notes, electronic forms(E-forms), etc. The original COC, FTR, and field notes must be submitted to the District laboratory at the time of sample submission. Using intermediate notes (e.g., stickers, labels, post-it notes, gloves, etc.) and transferring information to standard records is not acceptable under normal circumstances since the expectation is that all original records is submitted to the laboratory along with the samples. Any non-standard record must meet the minimum records requirements specified in this section and must be approved by the WQMS QA Officer (QAO).

The types of records and documents produced by the Water Quality Monitoring Section (WQMS) include, but are not limited to: audit reports, administrative records, instrument maintenance records, standard set ID logs, instrument maintenance logs, DI carboy check out logs, ethics and data integrity agreements and training records. Records produced by WQMS must be archived and retained in accordance with the *Archive Records Storage and Retention SOP* (SFWMD-FIELD-SOP-022).

7.1 Sampling Reference Documents

The Water Quality Monitoring Section Quality Assurance (WQMS QA) team is responsible for assuring all in-house staff and external contractors are supplied with the current controlled copy of this manual and all relevant Standard Operating Procedures (SOPs), and that old copies are retrieved. The most recent versions of these documents are housed in the WQMS SharePoint Team Site; hard copies of these documents may not be controlled, so care should be taken that the most recent version is being used. The current versions of QA documents are housed in the WQM Controlled Documents library on the WQMS SharePoint team site; hard copies of these documents that are not controlled must not be used.

Document review typically occurs on an annual schedule; however, more frequent revisions may be made as new protocols are developed and/or clarified. Staff will be notified via email when a document has been revised and instructed as to the change that has been made. Changes to policies and/or procedures are considered effective upon the date of the last signature (WQMS QAO). Superseded versions of these documents are also housed electronically by WQMS QA. The WQMS SharePoint team site documents are synched with WQMS field computers enabling staff to seamlessly access the current versions.

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7.1.1 WQMS Controlled Documents

Controlled documents are those that are managed to assure accuracy, consistency, and compliance with quality management requirements. For example, SOPs, quality manuals, monitoring plans and other technical documents ***must be*** controlled to prevent unauthorized alteration or use of outdated copies. WQMS documents are updated periodically; an email notification is sent announcing each update. Staff will be required to sign an electronic form, acknowledging responsibility for receiving and reviewing the document after a revision. Any questions or suggested changes to a WQMS document must be communicated by comment or edit through the draft document review library . The *Electronic Forms SOP* (SFWMD-FIELD-SOP-029; Section 4.3.9 :How to Create a WQMS Excel Acknowledgement eForm) details the procedure for using the document signature form for acknowledgment of a controlled document or documents (e.g., SOPs).

Supervisors and the WQM QA Team are responsible for WQMS staff, having access to the latest controlled copies, and ensuring obsolete copies are removed from the WQMS SharePoint libraries. Field Project Managers (FPM) are responsible for keeping their monitoring plans up to date with the current version, signed, and in the appropriate SharePoint library.

All WQMS field staff are responsible for having access to the WQMS Control Documents folder in SharePoint, therefore, supervisors and their direct reports are responsible for creating a WQMS Controlled Documents folder that automatically synchronizes to the WQMS Controlled Documents library and sub-libraries on their computer. Instructions for how to do this are located in Section 7.1.2 below. Any problems with creating or syncing the folder are to be reported to individual's supervisor. Field staff must assure ALL of their folders have successfully synced prior to taking their computers to the field for the day.

For sampling events where the computer is not utilized in the field (e.g., Marsh collection), a *controlled*, hard copy of the applicable SOP(s) must be taken on the trip. A hard copy, controlled version of any QA document is obtained from the WQMS QA Team. Other controlled documents located in SharePoint libraries include Operational Monitoring Plans, Compliance Monitoring Plans, Electronic Forms, and Equipment Manuals. Although these are not controlled documents, staff are responsible for assuring these documents sync successfully, so the current documents are located on their computers in the WQM Controlled Documents folder.

The WQMS QAO will keep a superseded version of the current version of each QA document. Documents used by the field technicians are described in Section 7.1.4. These processes are described in *Archived Records Storage and Retention SOP* SFWMD-FIELD-SOP-022. Changes to policies and/or procedures are considered effective upon the final signature (WQMS QAO).

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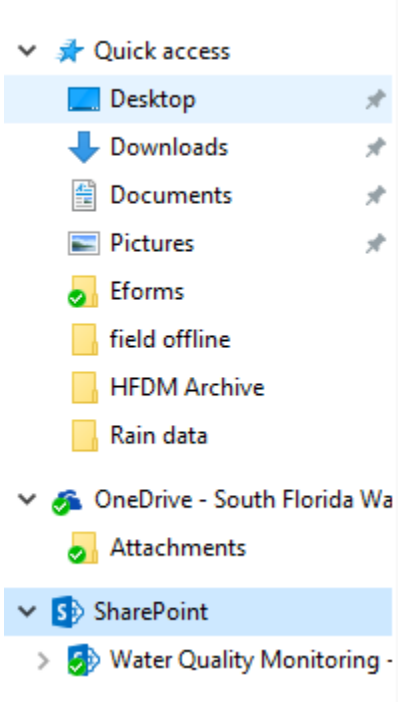
7.1.2 Access to Controlled Documents in SharePoint

How to access the 'Controlled Documents' library on the Windows 10 ruggedized field computers after syncing with the controlled documents library.

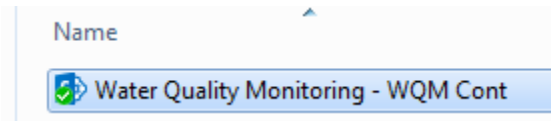
- Click on the windows explorer icon on your Taskbar to open the windows explorer window;

- In the windows explorer window, on the left, click on the 'SharePoint' link



  - If the SharePoint link is not available go to the steps on how to sync the 'Controlled Documents' library

- In the windows explorer window, on the right, double click on the 'Water Quality Monitoring' link. The Controlled Documents library is now open in your windows explorer window. You should be able to see all items that are syncing from our WQM team site



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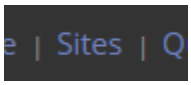
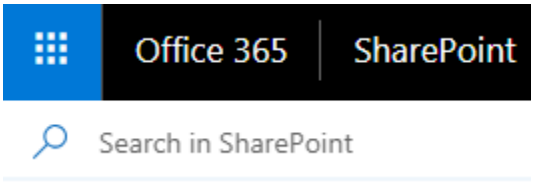
How to Sync the 'Controlled Documents' library to the Windows 10 ruggedized field computers

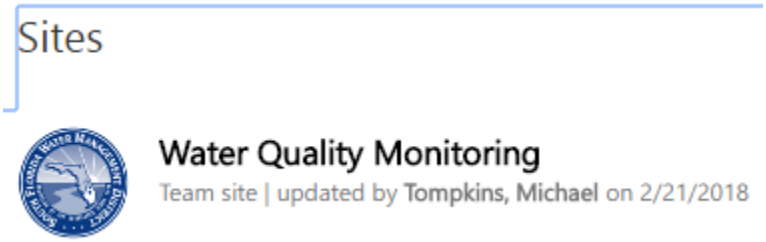
- Open your internet browser. From the Districts internal home page, click on 'Sites' link at the top of the page;



- Sign in using your District credentials if prompted;
- At the top left you can search for the 'Water Quality Monitoring' team site if it is not displayed anywhere

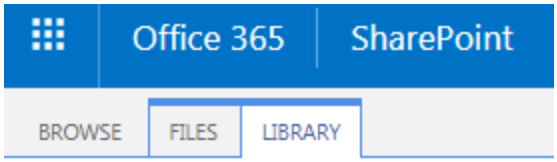


- Click on the 'Water Quality Monitoring' team site from the available list;



- Click on the 'WQM Controlled Documents' link from the list on the left side of the page;

- At the top left of the page click on the 'Library' tab



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- Click on the 'Sync' icon located within the Connect & Export group under the Library tab;

- Follow the onscreen instructions to complete the Sync process;

7.1.3 Field Sampling Manual

The Field Sampling Manual (FSM) is a reference for District personnel and internal/external contractors involved in the collection and submittal of samples for laboratory analysis and/or measurement of field parameters. The current version of the FSM is available in the FSM-QM library, located within the WQM Controlled Documents library on the WQM SharePoint team site. Paper copies of the FSM are not controlled.

7.1.4 Standard Operating Procedures (SOPs)

SOPs provide information pertinent to a specific task or process, facilitate consistency in the integrity, reproducibility, and quality of data, and have been written for certain tasks not all specified herein. These include, but are not limited to:

- Specific field sampling methods,
- Calibration and maintenance of instruments, and
- Review of field data.

SOPs shall follow the guidance provided in: Preparing, Reviewing, and Managing SOPs (SFWMD-FIELD-SOP-001). The current versions are housed within the SOPs library, located within the WQM Controlled Documents library on the WQMS SharePoint team site. If using a controlled, paper copy of an SOP, it is the individual staff's responsibility to assure they are using the current version.

7.1.5 Monitoring Plans

The Section utilizes two types of monitoring plans: 1) a compliance monitoring plan (CMP) written to detail permit/mandate-specific requirements, and 2) an operational monitoring plan (OMP) intended as an internal document detailing all components of a project, including mandated and non-mandated sampling and activities. A CMP is typically written during the permit request process and in its final form is part of the issued permit. CMPs are modified as part of the permit modification process. OMPs shall follow the guidance provided in: Field Project Management SOP (SFWMD-FIELD-SOP-033).

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A monitoring plan:

- Describes what, where, when, and why a project is being conducted,
- Includes project-specific sampling requirements including required analyses and sampling frequency, and
- Refers to the FSM and/or the appropriate SOP(s) for procedures that are *not* project-specific.

The current Monitoring Plans are available within the Monitoring Plans folder on SharePoint, located within the WQM Controlled Documents folder on the WQMS SharePoint team site.

7.1.6 Electronic Signature

The requirements for electronic signature used by WQMS are in accordance with the specifications required in FDEP SOP FD1200.6. Electronic signatures as employed by WQMS are secured with the user's enterprise login ID and Password using digital certificate(s) obtained by the individual in accordance with the District's Information Technology Policy. Enterprise login credentials must be kept confidential to prevent unauthorized use or access (SFWMD Procedures, Part II, Chapter 230, Article VIII). The procedure for using an electronic signature to sign controlled documents is specified in the *Preparing, Reviewing, and Managing Standard Operating Procedure for SOPs SOP* (SFWMD-FIELD-SOP-001).

7.2 SharePoint Team Site Administrators Roles & Responsibilities

The WQM SharePoint team site and its libraries are administered by staff (Admins) who are responsible for uploading and maintaining all files and libraries within the WQM SharePoint home library. They are also responsible for communicating SharePoint problems and issues with the District's IT staff. Controlled libraries, such as the WQM Controlled Documents library, have limited permissions allowing only Admins the capability to post and delete files. Final, signed document(s) are emailed to an Admin to post and, if appropriate, replace the version in the library. Other libraries have less stringent permission restrictions. For example, the WQM Review library allows FPMs or others to post documents for review; reviewers can comment and edit. Only Admins can delete a file or change a file's properties (e.g., name or location).

There are two processes for posting a new document in the WQM Controlled Documents library and notifying the appropriate WQMS staff:

- Controlled Documents
  1. The WQMS QAO emails the final signed PDF of either an SOP or FSM to an Admin to post in the WQM Controlled Documents library.

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2. The Admin verifies the file name, cover page, header, and signature page all have the same version number, and that the new version is a higher version number than the posted version.
3. The WQMS QA Team emails an Acknowledgement Signature EForm to the appropriate WQMS staff (FSM, Section 7.1.4).

- Non-controlled Documents

1. The Field Project Manager (FPM) emails the final signed PDF of monitoring plans to an Admin requesting it be posted to the appropriate WQM Controlled Documents library.
2. The Admin verifies the emailed version number of the document is higher than the version posted.
3. The Admin verifies the file name, cover page, header, and signature page all have the same version number, and the new version is a higher version number than the one currently posted.
4. The Admin replaces the older version with the newer version and sends an email notification to the FPM.

The FPM emails the Field Unit Supervisor(s) responsible for collecting samples for the Project with notification of the updated Project Monitoring Plan

7.3 Sample Custody

Mandatory Acceptance Criteria at Time of Sample Delivery

- Collection Date and Time
- Station ID
- Registered collectors name and/or collector number
- Signature with date of person completing the records
- Time stamp on the records (i.e., COC, header sheet, PSR, etc.)

Procedures to Assure Sample Integrity

This FSM, Quality Manual (QM) and all SOPs have been designed to identify means and methods to assure sample integrity from collection through final reporting. In the event improper procedures are discovered, investigations and corrective actions must be initiated.

In rare cases, sample containers may have been mislabeled (sample mix-up) during sample collection. When these samples are identified, either through visual inspection, or because of information from analytical determinations, an investigation is initiated to determine if the records (or other evidence) associated with the samples can be used to correct the problem. In many cases, it is possible to resolve the problem during sample receiving. However, in cases where the mix-up cannot be resolved, it could result in the generation of questionable or invalid data.

To prevent the possibility of this type of data misinterpretation resulting in wasteful data generation and potential availability in DBHYDRO, especially for compliance determinations, a

procedure for these rare cases was instituted by SFWMD in 2008. After investigating cases of potential sample mix-up where definite resolution cannot be reached, rather than accepting and completing analysis of samples that have been clearly mislabeled, the samples will be rejected by the WQM QAO in collaboration with Laboratory QAO, and WQM QA will immediately contact the FPM and Section Administrator in case re-sampling is necessary.

Unresolved sample mix-ups previously addressed by the QA Administrator memorandum entitled "Procedural Change for Potential Sample Mix-Up Events" dated December 4, 2008, are resolved in accordance with Section 6.7 of the laboratory CLQM and the above language in this FSM.

Sample Access after Relinquishing

Access to any samples once relinquished to AS Section staff is only permitted after notification of WQMS and AS QA personnel. This includes all access to samples for the purpose to investigate potential field errors (sample mix-up or mislabeling) or to investigate issues identified by AS staff with the samples (such as debris or insects in the sample). All access must be accompanied by AS QA, login staff or by a AS Supervisor. Access to samples is limited to observation, relabeling and photos only while the laboratory has custody of the samples. In the case of relabeling of samples, login staff will fill out a Sample Mix-up or Improper Preservation Investigation form and that form also needs to be signed by a WQMS QA staff or the FPM.

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Section 8: Field Quality Control Measurements and Requirements

8.0 Field Quality Control

Field quality control (QC) measures are developed to monitor a sampling trip to:

- Assure samples are representative of the sample source.
- Assure that the field data are within stated limits of precision and accuracy.
- Identify possible sources of contamination.

Field QC measures are collected in the form of check samples such as replicate samples and various blanks.

For projects with routine, periodic collection frequencies, Quality control procedures must be followed as specified below. For certain atypical project situations such as project startup, tailored QC frequencies may be specified by WQMS QA in coordination with project management, based on project needs, logistics and optimization to prevent oversampling of QC.

Consequently, all field QC check samples **must be** prepared on-site where the associated sample is collected. In some cases, such as where samples are processed in the laboratory (e.g., Fish processing, Marsh sample processing), the QC samples are also processed in the laboratory to assess the same equipment and processing environment. When this occurs in the laboratory the station identification must be FOCQC unless the processing occurs in the Okeechobee laboratory in which case the station identification must be OKEELAB.

Note: If all marsh samples on a trip are collected by direct grab and no processing is to be done back at the laboratory, an FB must be collected in the field. If that FB is mistakenly not collected in the field, the field QC blank must NOT be collected at the FOC, any Field Station (e.g., Okeechobee Field Station), the Laboratory, any parking lot or roadside pavilion/park, etc. or any other location not listed herein away from where a sample is collected (or processed if it is a marsh sample collection as described above).

Blanks are collected to assess whether a sample has been contaminated by:

- Sample collection equipment (e.g., Van Dorn, composite bucket, etc.) (EB and FCEB only)
- Ambient environmental conditions
- The sample bottles
- Analyte-free water
- The preservatives used
- Sample transport and/or storage conditions
- Laboratory processes

When collecting field QC, it is important to mimic the sample collection process as closely as possible. See the FSM section or SOP for the specific sampling method for which the field QC is

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being collected. The intent of QC collection is to assess the sampling trip to assure that the collected samples are representative of the sample source. The recurrence of blank results greater than the method detection limit may be indicative of a systemic issue.

8.0.1 Field QC Blank Association

For the purposes of data validation, *all* blanks are associated with *all* samples collected on a single sample trip. In addition, for the purposes of fish processing in the laboratory, all samples are associated with all blanks processed on the same processing day.

8.1 Field Quality Control Blanks

All QC blanks (Table 16) must be chemically preserved, stored, transported and analyzed with the collected field samples. QC blanks for sediment and fish are not collected at the same frequency, these matrices are somewhat project specific. QC blanks for sediment are typically AFW, chemically preserved, stored and transported with the collected field samples. However, QC blanks for Fish are not collected until the processing of the fish tissue and are typically AFW.

Procedures for cleaning and/or rinsing equipment prior to collecting blanks must be consistent with procedures used prior to collecting samples (e.g., no extra rinsing). When collecting field QC, it is important to mimic the sample collection process as closely as possible, including agitation. The intent of QC collection is to assess the sampling trip to assure that the collected samples are representative of the sample source. The recurrence of blank results greater than the method detection limit may be indicative of a systemic issue.

Field QC requirements are applied on a trip and/or project basis. Additional QC checks other than the minimum required may be collected to satisfy specific project requirements. At a minimum, blanks must be collected at a frequency of 5% of the total number of samples collected for the life of a project. If, for any reason, there is no field QC blank associated with a sampling trip or processing batch (e.g., fish processing) and the 5% requirement stated above has been met, the data for the trip or processing batch are qualified with a PMR and carry the comment "No field QC blank associated with this sample. Project field QC blank frequency meets or exceeds the requirement of 5% for the life of the project".

When a field QC blank that is submitted for any analyte other than metals is improperly preserved, and would then be qualified based on that improper preservation, the affected ACODES/tests are cancelled for that field QC blank. For metals samples, the requirement is that they must be acidified at least 24 hours before laboratory sample preparation takes place, so they may be acidified in the laboratory and submitted according to the laboratory's acceptance procedure., This acceptance procedure includes an improper sample preservation form to be filled out and special procedures to record when the sample was acidified. If there was only one field QC blank collected for the affected tests, the associated sample ACODES /tests are then qualified with a PMR and the requested result comments state the sample analytical result is not associated with a field QC blank. The following procedure should be followed:

- First determine which bottle was not properly preserved. Then determine which ACODES/tests are affected from Table 9.

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- Each associated sample that contains these ACODES/tests must then get a PMR, but just on those affected ACODES/test. For example, if the sample had grey, magenta and beige bottles, but only the magenta bottle was under-acidified, the ACODES/tests TKN, TN, TPO4 and TOC would be the only ones to be associated with the PMR. This PMR must state that "the sample analytical result is not associated with the field QC blank" there should also be a comment "The qualifier for this sample is due to improper preservation".
- In a separate correction you would then cancel the ACODES/tests associated with that bottle for the QC Blank.

If an ACODES/test is requested for a blank but the corresponding test is not requested for the associated samples, the ACODES/test requested for the blank must be cancelled.

All field QC check samples must be collected on-site or where the samples are processed depending on the sampling method specified in this document or the specific SOP. The procedures for collecting the field QC check samples are provided in the following sections.

New equipment with different construction / catalog number / manufacturer than currently used equipment, must be assessed for contamination prior to use. An equipment blank must be collected using the piece of new equipment and submitted for the analytes that will be collected using the equipment. Contact the QAO or QA Team member for assistance in determining which analytes must be included.

For equipment blanks and field cleaned equipment blanks, collected through a Van Dorn, where the spigot is used to process the sample and an autosampler bucket is used, a minimum of approximately one liter of water must be passed through the spigot of the Van Dorn into the bucket. The remaining may then be released into the bucket by opening the Van Dorn end cap.

The equipment used to collect the field QC blanks includes all of the sampling equipment listed at the top of the surface water notebook unless noted in the comments for the blank.

All field QC blanks must be preserved with the greatest amount of preservative that was required in the associated sample set; note the amount in the field records. Excess acid preservation may interfere with laboratory analysis of the sample so the pH must not be less than pH 1.3 S.U.

8.1.1 Low Water Level or Dry Season QC Blank Collection

- The following procedure applies to trips that require sampling determination while on site (e.g., LOWA trips, PIE trips, dry season sampling, etc.). These trips may also require a change to the sampling methodology in order to collect a representative sample when the water depth is low. These scenarios may also include a situation where the sampler does not know with certainty what samples will be collected during a trip. Please use the following specifications for collecting blanks for these types of trips or see Section 8.1.1.2 Sampling With Intermediate Devices Flow Chart, below. Always collect a blank at the first station where you collect sample.
  - If a direct grab is collected first using a dipper wand, then a FB must be collected at that station.

- If an intermediate device (ID) such as a 1L swing sampler or Van Dorn is used during the trip, and it **is not** the last station of the day, then a FCEB must be collected at that station.
    - If a FB is collected first and a FCEB or EB is required to be collected at any subsequent station, then the original FB must be discarded.
- If an intermediate grab is collected using a swing sampler or Van Dorn during the trip, and it **is** the last station of the day and the device has not been used previously, then an EB must be collected.
- If the dipper wand is used at any point after collection using an intermediate device (and a blank has been collected), then the FB is not collected.
- If a second Intermediate Device (ID2) is used twice during a sampling trip and the second use of ID2 does not occur at the last station of the day, then an additional FCEB for ID2 must be collected.
- If separate FCEBs are collected because two intermediate devices are used, both blanks are submitted. A comment must be made that records what Intermediate Device was used to collect each blank

8.1.1.2 Sampling With Intermediate Devices Flow Chart

For sampling events where low water is identified and different equipment may be used for field sampling staff to help with process decisioning.

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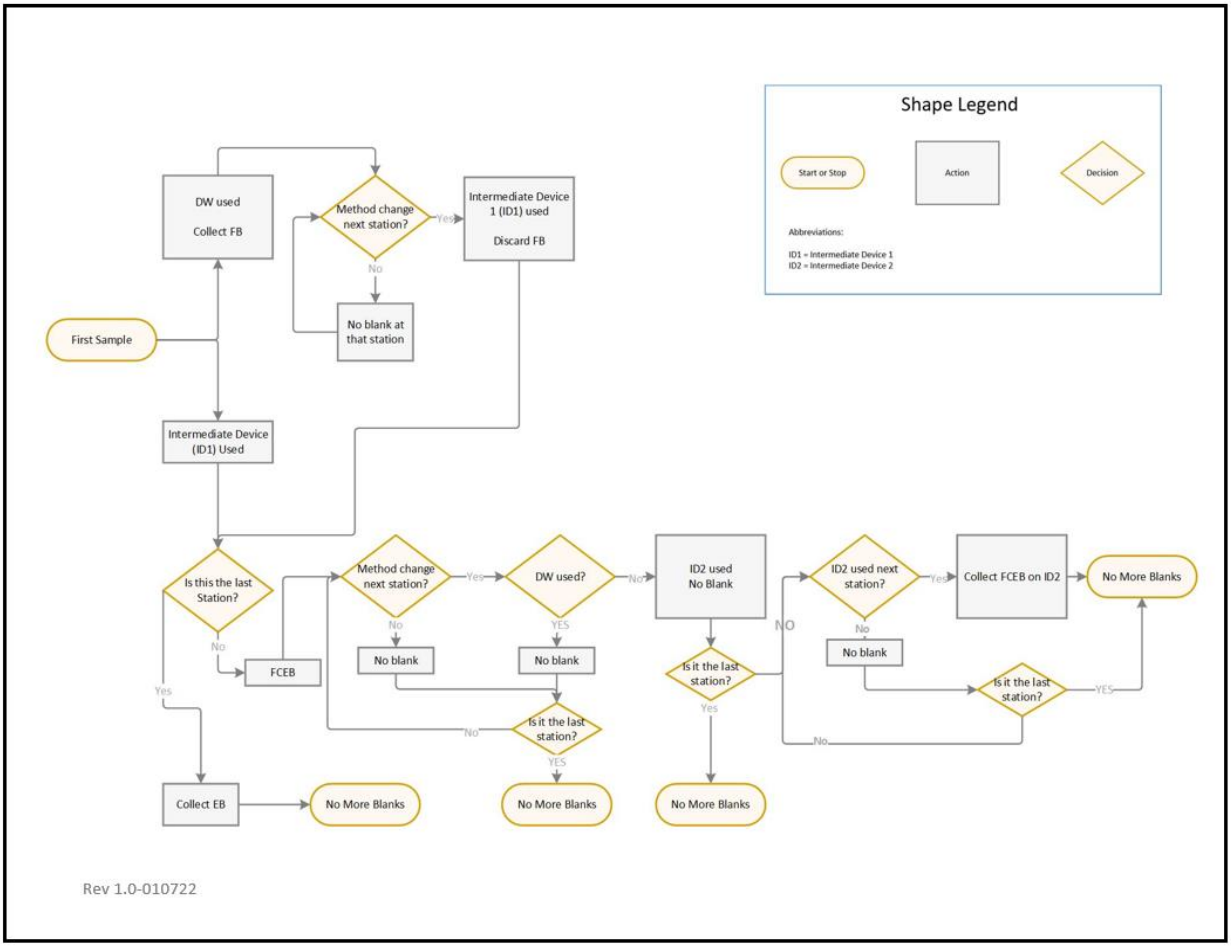
Figure 4. Sampling With Intermediate Devices Flow Chart



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8.1.2 Equipment Blank (EB)

An Equipment Blank must be collected and processed before any sample is collected (or processed in the case of marsh sample collection) using sampling equipment that has been brought to the site pre-cleaned.

- If samples are collected more frequently than quarterly or every two months, then only one EB needs to be collected per quarter (per project).
- For projects collected less frequently than quarterly or every two months, the EB must be collected every other trip.
- For projects that are collected for short durations and/or seasonally and the duration includes multiple quarters (e.g., PSMM is collected from December to March), one EB must be collected for every 4 months of sampling.
- EBs ***must not be*** prepared at the base of operations with the exception of helicopter collection EBs and RAIN project samples.
- EBs must be collected at the first station where equipment is used to collect samples (which may or may not be the first station visited) before the sample collection equipment is used.
- To ensure that the EB includes a full suite of parameters, it should be collected on the sampling day of the project with the longest parameter list.
- The EB must be collected to match a list of all parameters sampled (usually via grab sample) for the projects associated with the sampling trip.
- A single EB may be linked to more than one project if collected during the same sampling trip (by the same sampling crew using the same sampling equipment). If two P-numbers are used for the same trip, only one set of blanks is collected, not multiple blanks or sets of blanks for the multiple P-numbers see the Field Records SOP, (SFWMD-FIELD-SOP-040)
- An EB would not be collected during a quarter for a project if no samples were collected.
- An EB ***must not be*** collected if there is no associated sample (i.e., location, method and parameters) on the same trip.
- An EB must be collected on any sampling trip where it is known beforehand that the sampling equipment will only be used once, and a Field Cleaned Equipment Blank (FCEB) ***will not be*** collected. If only one sample is collected on a sampling trip because of flow-dependent sampling and an EB is not collected, a Field Blank (FB) must be collected.
- Gloves must be changed before collection and processing of all QC samples.

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8.1.2.1 EB Collection Method:

- The EB must be collected using a single train of sampling equipment (i.e., the autosampler sampling equipment combined with the grab sampling equipment). Surfaces of equipment that do not contact sample are not included in the EB.
- The equipment and sample bottle ***must not be*** rinsed prior to collection of an EB.
- EBs must be prepared by pouring AFW greater than the volume of the sample bottles through each piece of sampling equipment and processing the rinsate into the sample collection containers.
- The pieces of equipment the AFW passes through or over are the same ones used to collect and/or process the sample. The intent is the AFW is exposed to the same surfaces of the equipment that touch the sample. This includes any drain valves or spigots used to dispense sample that are attached to Van Dorn or buckets..
- For dissolved parameters, the filter must be rinsed with a minimum of 30 ml or 250 ml, if applicable, of water and the rinsate from the filter is discarded prior to collection of the EB. The remaining sample water or AFW in the syringe may be used to fill sample bottles.
- The EB must be preserved according to each sample bottle label.

For marsh sample collection, where the samples are collected and then later processed at the base of operations, the EB is processed before any of the samples are processed. In this case, the collection time for the EB will be after the collection times for the samples, however the processing time for the EB will be before the sample processing times.

8.1.3 Field Cleaned Equipment Blank (FCEB)

A Field Cleaned Equipment Blank must be prepared using sampling equipment that has been cleaned in the field at a sampling station after sample collection.

- One FCEB must be collected during each sampling trip (i.e., each sampling day) where intermediate equipment is used and cleaned at more than one station.
- The FCEB may be collected at any station during the sampling trip after the first sample is collected.
- The FCEB must be collected to match the list of all parameters sampled (usually via grab sample) for the project(s) associated with the sampling trip.
- Gloves must be changed before collection and processing of all QC samples.
- If it is known at the beginning of the trip that only one sample will be collected and no equipment will be cleaned in the field, an EB must be collected.

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8.1.3.1 FCEB Collection Method:

- The FCEB must be collected after the equipment has been cleaned in the field.
- A single train of sampling equipment must be used to collect a FCEB (the autosampler bucket, swing sampler 1L bottle are combined with the grab sampling equipment).
- The equipment (e.g., syringe) ***must not be*** rinsed following the regular three (3) equipment cleaning rinses prior to collection of the FCEB.
- FCEBs must be prepared by pouring AFW greater than the volume of the sample bottles through each piece of sampling equipment and processing the rinsate into the sample collection containers.
- Surfaces of equipment that do not contact sample are not included in the FCEB.
- The pieces of equipment the AFW passes through or over are the same ones used to collect and/or process the sample. The intent is the AFW is exposed to the same surfaces of the equipment that touch the sample. This includes any drain valves or spigots used to dispense sample that are attached to Van Dorn or buckets.
- The sample bottles must be rinsed one (1) time with the rinsate AFW prior to collection of the FCEB.
- For dissolved parameters, the disk filter must be rinsed (purged) with a minimum of 30 mL of rinsate AFW, and the rinsate from the filter is discarded prior to collection of the FCEB, the remaining 30 mL in the syringe can be used. Capsule filters used with a peristaltic pump and/or syringe must be rinsed (purged) with a minimum of 250 mL rinsate AFW ***prior to*** collection of the FCEB. This process must be consistent throughout the day's trip.
- The FCEB must be preserved according to the sample bottle label.

8.1.4 Field Blank (FB)

A Field Blank monitors on-site sampling environment, sample bottle cleaning, the suitability of sample preservatives, analyte-free water, sample transport and storage conditions and laboratory processes. A FB is required if ***no other*** blank is collected for the sampling trip or in addition to other QC blank(s), when there are obvious concerns of environmental contamination during sample collection or processing (e.g., construction dust, ash, etc.) at a specific station.

- FBs collected due to concerns for environmental contamination must be clearly recorded in the field notes as to why the blank was collected and the conditions that existed.

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- If the concern of contamination applies to more than one station, only one FB is required, but the stations associated with it must be recorded in the field notes.
- If no other blank was collected on the trip, the FB must be collected to match a list of all parameters sampled (usually via grab sample) for the project(s) associated with the sampling trip.
- Gloves must be changed before collection and processing of all QC samples.

8.1.4.1 FB Collection Method:

- The sample bottle must be rinsed once prior to filling with AFW.
- The FB must be collected by pouring AFW directly into the sample bottle(s)
- The FB is not filtered
- The FB requires the same acid and thermal preservation as the corresponding sample(s)
- The FB must have the same environmental exposure as the corresponding sample(s). The FB needs to be left open for the same amount of time, but not necessarily at the same time as the sample processing.
- The time for the FB is different than the corresponding sample collection time.
- Please see the HFDM SOP (SFWMD-FIELD-SOP-018) for directions on how to add a sample upon the return to the base of operations.

8.1.5 Replicate Sample (RS)

A Replicate Sample is collected and analyzed to evaluate the precision of the sample collection and handling process, and environmental variability. **Note:** If any test(s)/ACODE(s)of an RS is cancelled for any reason but the entire RS is not cancelled, the Sample and the other RS must receive a sample comment that states the test(s)/ACODE(s) was cancelled and that test(s)/ACODE(s) must be treated as an FD for validation.

- RSs are not collected for autosampler sampling methods.
- If samples are collected more frequently than quarterly (or bi-monthly), then only one set of RSs needs to be collected per quarter (per project).
- For projects collected less frequently (e.g., every quarter or every two months), the RSs must be collected every other trip.
- For projects that are collected for short durations and/or seasonally and the duration includes multiple quarters (e.g., PSMM is collected from December to March), one RS must be collected for every 4 months of sampling.
- For certain atypical project situations, such as project startup, tailored QC frequencies (i.e., mosquitofish- the RS frequency is 5% of samples for all projects

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for the CY) may be specified by WQM QA in coordination with project management based on project needs and logistics.

- Two RSs must be collected, per project, at the same station, on the same day, and if possible, with the longest parameter list. For trips where there is not one station that includes all parameters for the trip, the FPM must prioritize which parameters are more important for the defensibility of the project and select the appropriate station for the collection of the QC. The QAO must assist in these situations.
- The RSs and the associated sample must be submitted for the same analyses.
- A single RS set (i.e., two RS) may be linked to more than one project if collected during the same sampling trip (by the same sampling crew using the same sampling equipment). If two P-numbers are used for the same trip, only one RS set is collected, not multiple RS sets for the multiple P-numbers.
- RSs need not be collected for a project during a given quarter if no samples were collected during that quarter.
- If a project is collected by more than one sampling group and/or agency, separate RSs must be collected by each of the sampling groups and/or agencies.
- If an RS set is scheduled on the COC, but is not collected, the RS P-numbers must be canceled and not designated as 'NOB'.

8.1.5.1 RS Collection Method:

- The sample and each RS have independent collection times.
- Two RSs must be collected by repeating the entire sample collection technique that was used to obtain the regular routine sample. This includes switching out gloves and rinsing the tray between samples.
- Sampling equipment does not have to be cleaned with AFW between the sample collection and each RS collection with the exception of the sampling tray, which must be rinsed because it is exposed to H2SO4 and HNO3 during the acidification process for the sample and each RS.
- The RSs must be collected, preserved, transported and recorded in the same manner as routine samples.
- Field parameter data, if collected for the regular sample, must be collected for each RS collection.

8.1.6 Field Duplicate (FD)

A FD is the collection of a sample and a single replicate. It is collected and analyzed to evaluate the precision of the sample collection and handling process, and environmental variability. FD were historically collected by the District, but this sample type is no longer routinely collected. If only one RS is collected, the sample type must be changed to FD. If any test(s)/ACODE(s) of an RS are cancelled for any reason but the entire RS is not cancelled, the Sample and the other RS must receive a sample comment that states the

test(s)/ACODE(s) was cancelled and that test(s)/ACODE(s) must be treated as an FD for validation.

8.1.7 Split Sample (SS)

Split samples are collected to evaluate inter-laboratory performance and are collected as a subsample of the parent sample. Splits are no longer routinely collected by WQMS.

8.1.7.1 SS Collection Method:

- The sample composite device must contain enough sample to ensure all sample bottles can be filled. The sample must be mixed to maintain sample homogeneity and aliquots of sample must be poured or filtered into the appropriate sample bottles.
- The collection time associated with the SS is the same time as the routine sample.
- Field parameter values **must not be** entered for a SS, only for the regular routine sample.

8.1.8 Filter Lot Blanks

- Each filter lot purchased by either the District or a contracted entity must be tested for contamination by the District laboratory prior to its use for sample processing.
- Five (5) filters from each lot number must be submitted to the District laboratory. Filters must not be used until the lot number has been cleared by the District laboratory.

8.1.9 ASEB for Tubing with Specific Lot Numbers

An Autosampler Equipment Blank (ASEB) is a specific equipment blank for bulk quantities of intake tubing and silicon tubing.

8.1.9.1 ASEB Collection Method:

- An ASEB must be submitted to the laboratory at least a month in advance so the laboratory will have a sufficient amount of time to analyze the samples without having to interfere with normal laboratory workflow.
- An ASEB must be collected from a single silicone pump head tube per batch of identical tubing lot numbers.
- An ASEB for the silicone tubing used for the autosampler distributor arm must be collected from a length of 5 feet of the tubing.
- For a single roll or multiple rolls of intake tubing that have identical lot numbers, an ASEB must be collected from a minimum length of 20 feet of the tubing.

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- Each unique lot number requires a unique ASEB to be collected.
- When the silicone tubing is taken out of its original packaging, it must be stored in a new bag as the original bags are subject to breakage.
- The tubing must not be rinsed prior to collection of the ASEB. No more than 500 mL must be run through the tubing when collecting a sample.
- The ASEB is analyzed for TPO4, TN and NOX. The NOX ***must not be*** filtered.
- AFW is run directly from the AFW faucet in the laboratory, through the tubing and into the bottle.
- After an ASEB is collected, the tubing must be stored in a sealed bag to minimize potential contamination, as any other piece of sampling equipment. To use the tubing in the field it must be dried (i.e. compressed air), otherwise it must be discarded. If tubing EB results show contamination another ASEB must be collected.

8.1.9.2 ASEB Documentation:

- A COC must be filled out with the stations identified as **ASEBOKEE** (for tubing located at Okeechobee field operations), **ASEBFOC** (for tubing located at the FOC) or **ASEBCON** (for tubing EBs collected by a contractor).
- The project is **ASEB** with these characteristics:
    - The samples type is **EB,**
    - The Prog type is **QA** and
    - The collection method is **G**.
- The comment line for each of these blanks must include one of the following standard comments:
    - "ASEB intake tubing",
    - "ASEB ISCO silicone pump head tubing" or
    - "ASEB silicone distributor arm tubing" and
    - Must record the manufacturer and lot number(s) of the tubing.
- Once the blank is submitted to the laboratory, an email must be sent with the P-number to the WQM QA team email notifying them the blank has been submitted.

  The P-number must be recorded/labeled on each roll per batch of intake tubing, and/or on each bag per batch of silicone tubing. The P-number **must also be** recorded in the Autosampler EB Results and Filter Inventory folder on the WQMS server in an excel file titled, "_ASEB_Results_asof_NOV_2020":

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\\ad\dfsroot\data\kb_wqm\QAFiles\AutoSampler_EB_Results_and_filter inventory

- Tubing must not be deployed until acceptable results from the ASEB for each batch are posted.
- The P-number written on the roll or bag of tubing must be recorded in the Autosampler Maintenance and Problem Report Form when tubing from a particular lot is deployed.

8.1.9.3 ASEB Results Evaluation:

- EB results will be retrieved from LIMS by a QA Team member and this information will be posted on the WQMS server in the ASEB.xls file. After the EB passes, the word "passed" must be written next to the P-number on the roll(s) or bag(s) for each batch of tubing. If the roll(s) or bag(s) for each batch of tubing has not been identified as "passed," then it must not be deployed. Other methods for sequestering tubing that has not been tested may be acceptable as long as steps are taken to identify the tubing that must not be used.
- The tubing must not be deployed if the EB is greater than or equal to an analyte's MDL or if the blank value is qualified with any qualifier other than a 'U' qualifier. If the blank value was greater than or equal to the MDL, then the following steps must be taken:
    - Pump head Tubing or distributor arm tubing: A new piece of tubing must be tested from the same lot.
    - Roll of intake tubing: A new 20 foot section of tubing must be tested.
    - The rerun of any lot of tubing must be identified in the comments that it is a rerun of a failed blank and the comments must include the P-number for the failed blank.

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Table 16. Field Quality Control Checks and Requirements

QC Type	Frequency (All Parameter Groups)	Sample/QC Associations	Review Element Criteria
Equipment Blank (EB)	• One per quarter; collected on-site prior to sampling • When an FCEB or FB is not collected • For autosampler tubing, an ASEB must be collected for each roll or lot number	Associated samples include all samples collected on the same sampling trip (day) by the same sampling crew and equipment.	Acceptance Criteria; <MDL. Qualify EB result if ≥ tested analyte's MDL. Qualify associated sample(s) if the result is ≤ 10 times the blank value.
Field Cleaned Equipment Blank (FCEB)	• One per trip; collected where field equipment decontamination occurs	Associated samples include all samples collected on the same sampling trip (day) by the same sampling crew and equipment.	Acceptance Criteria; <MDL. Qualify the FCEB result if ≥ tested analyte's MDL. Qualify all sample associated results with concentrations ≤ 10 times blank value.
Field Blank (FB)	• Required when sampling directly into sample bottle and/or an EB and FCEB are not collected • Discretional if environmental contamination is suspected	Associated samples include all samples collected on the same sampling trip (day) by the same sampling crew and equipment.	Acceptance Criteria; <MDL. Qualify FB result if it is ≥ tested analyte's MDL. Qualify associated sample results ≤ 10 times blank value.
Replicate Sample (RS)	• Two per quarter per project from the same station, on the same day	Associate the sample with the same Station ID.	Acceptance Criteria; <20% RSD for water sample, <35% RSD for soil and fish tissue samples. Qualify RS result if it is ≥ RSD. Qualify RS samples with 'J' a. If **all** results are ≥ 5 times PQL qualify all sample results. b. If **some** results are ≥ 5 times PQL and **some** are < 5 times PQL, but ≥ MDL, subtract the smallest result from the highest. If the difference between them is > PQL, qualify all sample results. If not, qualify only results which are >PQL. Provide feedback to the affected group and initiate troubleshooting or other corrective action.
Field Duplicate (FD)	• Collected only if project mandated.	Associate the sample with the same Station ID.	Acceptance Criteria; <20% RPD for water sample, <35% RPD for soil and fish tissue samples. Qualify FD result if it is ≥ RPD. Provide feedback to the affected group and initiate troubleshooting or other corrective action.
Split Sample (SS)	• Collected only if project mandated.	Associate sample with the same Station ID and the exact collection date/time.	Provide feedback to the affected laboratory and initiate troubleshooting or other corrective action with that laboratory. Relative Percent Difference (RPD) or Relative Standard Deviation (RSD) criterion: 20%.

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8.2 Data Qualifier Codes

If field and/or laboratory data need to be qualified the codes used are listed in Table 17.

Table 17. Data Qualifier Codes

Qualifier/ Remark Codes*	Definition
PMR	Project Manager Remark. Qualifier set at project manager's request. Does not produce a "yes" in the flag column in DBHydro.
PMF	Project Manager Flag. Qualifier set at project manager's request. Produces in a "yes" in the flag column in DBHydro.
A	Value reported is the mean (average) of two or more determinations.
B	Results based upon colony outside the acceptable range.
F	When reporting species; "F" indicates the female sex.
G	Indicates that the analyte was detected at or above the method detection limit in both the sample and the associated field blank, equipment blank, or trip blank, and the sample value was less than 10x of the associated blank value. The value in the blank shall not be subtracted from associated samples.
H	Value based on field kit determination or screening test not equivalent to laboratory method; results may not be accurate. This code is used if a field screening test was used to generate the value and the field kit or method has not been recognized by the Department as equivalent to laboratory methods.
J	Estimated value; value may not be accurate (number codes specified below used in LIMS only). The qualified sample value shall be accompanied by a detailed explanation to justify the reason(s) for designating the value as estimated.
J1	Surrogate % rec. exceeded (LIMS-specific, only 'J' is transferred to DBHYDRO).
J2	No known QC criteria exists (LIMS-specific, only 'J' is transferred to DBHYDRO).
J3	Precision or accuracy criteria not met (LIMS-specific, only 'J' is transferred to DBHYDRO).
J4	Matrix interference (LIMS-specific, only 'J' is transferred to DBHYDRO).
J5	Improper laboratory or field protocol (LIMS-specific, only 'J' is transferred to DBHYDRO).
K	Actual value is known to be less than the value given. This code shall **not** be used for field-testing measurements where quantitative bracketing is required.
I	The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.
?	Data are rejected and should not be used.
*****	Not analyzed due to interference.
D	Measurement was made in the field (i.e., *in situ*).
E	Indicates that extra samples were taken at composite stations.
R	Significant rain in the past 48 hours.
!	Data deviates from historical concentration ranges.
L	Actual value is known to be greater than value given. This code shall **not** be used for field-testing measurements where quantitative bracketing is required.
M	When reporting chemical analyses; presence of material is verified, but not quantified; the actual value is less than the PQL.
N	Presumptive evidence of material present in the sample.
O	Sampled, but analysis lost or not performed.
Q	Sample held beyond the accepted holding time. This code shall 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.

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Qualifier/ Remark Codes*	Definition
S	Secchi disk visible to bottom of water body. The value reported is the depth of the waterbody at the location of the Secchi disk measurement.
T	Value reported is less than the laboratory method detection limit.
U	Indicates that the compound was analyzed for, but not detected.
V	Indicates that the analyte was detected in both the sample and the associated method blank.
Y	The laboratory analysis was from an unpreserved or improperly preserved sample. Data may not be accurate.
Z	Colonies present were too numerous to count (TNTC); the numeric value represents the filtration volume.

*An explanation for the qualifier must be included in the sample comments for each datum.

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Appendix 1: Glossary of Terms

Glossary

This glossary is not all inclusive. If you are looking for a definition that you can't find here, please contact a member for your WQM QA Team.

Acceptance criteria The numerical limits, prescribed by an approved testing method, by which a result is verified. Acceptance criteria are usually established for calibration, precision, sensitivity and accuracy. (See Table 11 of the Field Testing section)

Accuracy The degree to which the result of a measurement, calculation, or specification conforms to the correct (true) value of a standard.

ACODE An abbreviation used to indicate the specific analyses ordered for each sample. Same as "tests" in HFDM and on the Chain of Custody.

Aliquot A portion of a larger whole, especially a sample taken for chemical analysis or other treatment.

Analyte (a.k.a. Tests, Parameter, ACODES) A substance whose constituents are being identified and measured.

Analyte-free water Water in which all analytes of interest and all interferences are below method detection limits.

Annual Once every 12 months.

Assure Used in QA: Used when the product/action/policy cannot be guaranteed to happen or the quality in relation to the specification meets a certain standard but not every instance is necessarily guaranteed to meet that specification.

Audit A systematic, independent and recorded process for obtaining audit evidence and evaluating it objectively to determine the extent to which the process meets the written specifications.

Autosampler An unattended automatic sampler programmed to collect samples based on a timed or flow-based trigger. See the autosampler collection program types ACF, ACT, ADT and ATF.

Autosampler Discrete Bottle (a.k.a. Discrete bottle, ISCO bottle) One of 24 bottles inserted into the carousel inside the base of an autosampler.

Biological tissue Includes tissues of plant or animal origin. The most common of these are shellfish, finfish and aquatic plants.

Blank An artificial quality control sample of an analytical matrix designed to monitor the introduction of contamination and/or interferences into a sample.

Calibration The setting or correcting of a measuring device usually by adjusting it to match or conform to a standard.

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Calibration Standard Solutions Purified quantities of a substance or material with a verifiable composition that are used to calibrate or verify the calibration of an instrument.

Canceled An action that the Results entry is canceled.

Chain of Custody (COC) Records that include the essential identifying information and other metadata for the Sampling trip.

Collection The process of obtaining a sample or field test data in the field. Collected samples are typically processed into sub-samples for submission to a laboratory for analysis.

Compliance Monitoring Plan (CMP) Monitoring Plan written to accompany the project permit. It contains project specifics for the permit but may not contain all of the specifics for the implementation of monitoring for the project. This additional information is located in the operational monitoring plan if created for the project.

Continuing Calibration Verification A standard analyzed during a measurement process to verify the accuracy of a calibration curve or other instrument calibration.

Data Collection The process of gathering and measuring information on variables of interest for project.

Data Quality The features and characteristics of a set of data that determine its suitability for a given purpose. Examples of data quality can include accuracy, precision, sensitivity, representativeness and comparability.

Data Quality Indicator data quality is assessed in different dimensions, such as accuracy, completeness, consistency, timeliness, and relevance. Each dimension reflects a different aspect of how well the data meets the requirements and expectations of the user.

Data Quality Objectives A set of specifications that must be established for an intended use of a set of data. These are commonly established for limits of detection and quality of data (precision, accuracy, representativeness, and comparability).

Data Validation A data review process according to predetermined validation criteria established as data quality objectives.

Deficiency A finding that identified a method, process, or product that does not meet the specifications in the listed quality system requirements. Deficiencies result in either a Quality Improvement or Process Improvement.

Depth (Sample) The depth at which the sample is collected.

Depth (Total) See Total Depth-

Detection Limit The smallest amount of an analyte that can be measured with a stated probability of significance. (See method detection limit)

Dipper Wand Golf ball retriever that is cut to accept a 120 mL bottle and a float, such as a fishing bobber, set to 0.5 m. Used for direct grab samples when TD is > 0.2 m.

Discharge: This code is required for only specific stations designated in the project's monitoring plan. This code represents a ***visual observation of flow*** at the time the station is visited.

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Discrete Bottle Refer to Autosampler Discrete Bottle definition.

Document Documents refer to written information that provides instructions, guidelines, procedures, specifications, policies, and other relevant information related to the WQMS Quality System.
These documents outline the processes and procedures required to establish and maintain the Quality System efficiently and effectively. Examples of these documents include: the WQMS Quality Manual (QM), Field Sampling Manual (FSM), Standard Operating Procedures (SOP), Monitoring Plans (MP), and forms.

Electronic Signature An electronic symbol or process attached to or logically associated with a document and executed or adopted by a person with the intent to sign the document.

Ensure Used in QA: Used when the product/action/policy can or must be guaranteed to happen or the quality in relation to the specification is known for certain for each occurrence of the action or product.

Environmental Sample Any representative sample from a natural or other source that may reasonably be expected to contribute pollution to or receive pollution from ground waters or surface waters of the state.

Equipment Blank Quality control blanks prepared on site during sampling by pouring analyte free water through field equipment into appropriate sample containers for each matrix and analyte group of interest. Equipment blanks are chemically preserved, stored, transported and analyzed with the collected field samples. Equipment blanks are intended as indicators of sample contamination related to the sampling equipment used. This includes contamination from the materials the equipment is made of, the equipment decontamination process, equipment storage, sample preservative, bottle, transport, and laboratory procedures.

Event A collection of samples grouped together by date.

External Refers to operations, personnel, documents and protocols from a party that is separate from or outside the SFWMD.

Field Blanks Quality control blanks prepared on site during sampling by pouring analyte free water into appropriate sample containers for each analyte group of interest. Field blanks are chemically preserved, stored, transported and analyzed with the collected field samples. Field blanks are intended to serve as indicators of environmental contamination, sample preservative, bottle, transport, and laboratory procedures.

Field Project Manager (FPM) Responsible for managing individual contracts and/or projects, developing and tracking project activities to make sure project requirements are met. The FPM also develops and maintains monitoring plans, reviewing field records and documents , confirming that all analytes are collected at the required frequencies and providing project technical guidance to District and contracted field staff and other District personnel.

Field Sampling Manual (FSM) A document stating the quality policy, quality system and quality practices and procedures, for field sampling and field data acquisition by WQMS. The FSM may also be used by other organizations where sampling procedures are

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requested or required by contract.

Filtrate Liquid that has been passed through a filter.

First Sample Trigger Date and time (FST) – See First Trigger Date (FTD).

First Trigger Date (FTD) The date and time the first sample aliquot was collected by an autosampler. The FTD is considered the beginning of the holding time for a sample. Same as FST.

Groundwater Includes all waters found below ground in confined or unconfined aquifers. Water held underground in the soil or in pores and crevices in rock.

Field Data Manager (HFDM) A computer application used to record field sampling activities associated with environmental sample collection.

Interference Any substance in a sample that may increase or diminish the amount of an analyte or otherwise affect the ability to detect and accurately quantify an analyte in the sample.

Intermediate Collection Container Container used to collect sample that is not the sample bottle. This is usually a large bottle. This is different than a sample collection device such as a Van Dorn (a.k.a. Niskin).

Internal Refers to operations, personnel, records, documents and protocols within the SFWMD.

Laboratory Information Management System (LIMS) A software system used to create laboratory documents, track samples and manage analytical results.

Method Detection Limit (MDL) The smallest amount of an analyte that can be analyzed by a given measurement system under specified conditions of sample processing and analysis, and reported with a 99% confidence that the concentration of the analyte in the sample is greater than zero.

Mock Collection Event A collection event simulated in the field for new personnel being audited during the introductory period. The simulated stations may or may not be active, and no samples or data from this event are relinquished to the laboratory.

Month/Monthly 30 calendar days.

No Bottle Sample (NOB) The NOB code is used to designate that No Bottle was collected and submitted for analysis for a specific station on a scheduled sampling trip. The NOB code must include a comment explaining why the sample was not collected in the Notes section (e.g., no flow, no recorded flow, sample could not be obtained due to vegetation impacts, sample pH too low, etc.). The collection date/time of a NOB is designated at the time it is determined that the sample will not be collected, or the station will not be visited.

Operational Monitoring Plan (OMP) A document that explains a project by defining the project organization, description, mandates and objectives. A Compliance Monitoring Plan may also be created for a project if needed for the permit. (See also Compliance Monitoring Plan)

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Parent Sample A sample from which aliquots or subsamples are taken for processing or testing purposes.

Performance Audit An audit where quantitative data are independently obtained for comparison with routinely obtained data in a measurement system.

Practical Quantitation Limit (PQL) The smallest concentration of an analyte that can be reported with an associated precision.

Precision A measure of mutual agreement among individual measurements of a parameter or an analyte, usually under prescribed similar conditions. Precision is best expressed in terms of the standard deviation.

Pre-Login Summary Report (PSR) Is generated in LIMS by WQMS staff. Typically, the PSR, labels, and decision paperwork, if applicable, are given to the collectors before the sampling event. The PSR consists of project information, stations/tests to be collected, and other pertinent information to collect samples for the day's trip.

Project Any undertaking carried out individually or collaboratively and possibly involving research or design, that is implemented to achieve a particular aim. WQMS projects are developed with stated objectives for collection of environmental monitoring samples and/or data.

Processing (a.k.a. Sample Processing) The activities associated with taking a collected sample and separating the parent sample into sub-samples so that the subsamples can be submitted to a laboratory. The Processing of samples into subsamples may include different preservation methods for its analysis. This processing may include filtration and/or acidification and/or thermal preservation in ice, depending on the analysis requirements for sample handling.

Process Improvement (PI) The denotation on the audit report indicating a process deficiency that does not result in the qualification of the data and is not suspected to directly affect the quality of a sample and/or field data, but may affect overall data integrity. (See also: Quality Improvement).

Pulse A programmed autosampler instruction that sets the number of "triggers" needed for the autosampler to collect a sample aliquot.

Quality Assurance (QA) An integrated system of activities involving planning, quality control, quality assessment, reporting and quality improvement to assure that a product or service meets defined standards of quality with a stated level of confidence.

Quality Assurance Project Plans A plan written for a specific project outlining data quality objectives, sampling, and analytical protocols and QC measures needed to satisfy the intended uses of the data. QAPPs are not commonly developed for WQMS projects unless the project involves a FDEP grant, in which case it is a typically a modified OMP with additional information and references. This is developed with the assistance of WQMS QA.

Quality Control (QC) An overall system of technical activities whose purpose is to measure and control the quality of a product or service so that it meets the needs of users. (e.g., collection of blanks or replicate samples).

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Quality Improvement (QI) The denotation on the audit report indicating a deficiency that may result in the qualification of sample or field data or a deficiency may have affected the quality of a sample directly and/or field data collected. This includes the representativeness of a sample, or any Quality Control samples collected. Quality Improvements must be addressed in a written response. (See also: Process Improvement).

Quality System Structured and documented management system describing the policies, objectives, principles, organization authority, responsibilities, accountability and implementation plan of an organization for ensuring quality in its work processes, products and services. The quality system provides the framework for planning, implementing and assessing work performed by the organization and for carrying out required QA and QC.

Recommendation (R) These are included on an audit report as suggestions that may improve overall quality of the data or efficiency in collection. No specific response is required.

Records Records are evidence that processes and procedures were completed. Records contain data and metadata relating to field sampling activities. Examples of WQMS records include: Chain of Custody, training records, calibration records, cleaning logs, standard solution set ID log, audit reports, etc.

Replicate Sample A Replicate Sample is collected and analyzed to evaluate the precision of the sample collection and handling process, and environmental variability. Collected by repeating the entire sample collection technique that was used to obtain the regular routine sample. Duplicate samples are one type of replicate sample.

Representativeness Expresses the degree to which data for a sampled source accurately and precisely represent a characteristic in terms of a measured analyte or parameter.

Relative Standard Deviation (RSD) is expressed in percent and is obtained by multiplying the standard deviation by 100 and dividing this product by the average. This is the deviation measurement that tells us how the different numbers in a particular data set are scattered around the mean. This is applied to the sample result and the two replicates to determine precision.

Rinsate or Rinse Water Water left over from a rinsing process. This could either be sample water or AFW.

Sample Bottle See Sample Container.

Sample Container Bottles, jars or zip type bags used to transport the sample to the laboratory for analysis.

Sample Custody All records and documents that trace sample possession, handling and associated supporting activities from the point of sample collection through transport, storage, processing, analysis and disposal of the sample.

Sampling Device Equipment used to collect sample. Usually, a mechanized device that requires hand cleaning between stations. The Van Dorn (a.k.a. Niskin) is an example of this. Different from an intermediate sampling container in that it is a mechanized device and not a bottle of some kind.

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Sampling Equipment All equipment in the sample equipment train that has contact with the sample before it is transferred to the sample bottle or jar.

Sampling Event Contiguous sample collection on a series of dates. This may extend to more than one day and may include samples from more than one project. Multi-day sampling events must be identified in the field notes for each day. Each day's records will have different P-numbers.

Sample Matrix The natural or artificial medium from which a sample is collected. For the purposes of the FSM, a matrix is categorized in terms of the sample source and associated collection technique.

Sampling Trip Sampling activities that occur over the course of one day. This includes all samples from a single submission but may contain one or more P-numbers. Samples are associated to the field QC by trip. Field data are also associated on a single trip by the IC and ICV (OCS) and the CCV (CCS).

Sampling Kit A set of sampling accessories that has been assembled for a specified use or project sampling event or trip. Examples of sampling accessories include sample containers, sampling equipment, chemical preservatives, calibration standards, pH strips, etc.

Science Technician (a.k.a collector) Person responsible for collecting water quality and biological samples, recording field sampling information, maintaining field records, maintaining and tracking field equipment and supplies within the WQMS at SFWMD.

Field Unit Supervisor Person responsible for managing the field sample and data collection unit, hiring and training of personnel in sampling and adhering to QA procedures, ensuring samples are collected using proper protocols, maintaining field equipment, scheduling and organizing field trips and tracking inventory within the WQMS at SFWMD.

Sediment The unconsolidated solid matrix occurring immediately beneath any surface water body. The surface water body may be present part or all of the time.

Site Geographic area that may delineate more than one station. Stations within a site are related by geographic proximity and/or data collection activity and/or project specifications. Sites are registered according to the Water Quality Monitoring Station Registration SOP.

Sonde (a.k.a. data sonde) A multi-parameter field instrument used to collect data for water quality monitoring projects. These are usually YSI, , Aqua Troll or Onset (HOBO) instruments. Sondes may be single or multiparameter. Sondes may be used to collect physiochemical parameters in real time (i.e., in situ grab) or continuously deployed, unattended. See Section 3 of the FSM for more information on the types of instruments used.

Station Exact location within a Site where a specific set of data and/or sample collection activities take place. The location is identified by an exclusive set of geographic coordinates. The geographic coordinates are defined during the station registration process.

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Stations are registered according to the Water Quality Monitoring Station Registration SOP.

Standard Operating Procedure (SOP) Written document that details the method of an operation, analysis or action whose techniques and procedures are thoroughly prescribed, and which is accepted as the method for performing certain routine or repetitive tasks.

Subsample Refers to any derivative obtained from a parent sample which may be composed of aliquots. The subsamples are processed differently depending on the specific analytical requirements.

Super Composite A location, typically sediment matrix, representing a defined area. To conserve resources for large projects, samples from different sampling locations can be pooled to form a single super composite sample for each operable unit (OU) or 1,000 acres. In this two-staged sampling approach, the analyses of the super composite representing the entire OU or 1,000 acres can be used as a screening mechanism to identify if additional separate analyses need to be performed on sediment samples from the individual sampling locations. Refer to the FDEP Protocol for Mercury and Other Toxicants and CGM 42 for additional information pertaining to super composite samples.

Super composite samples are registered at a station and associated with site that delineates the area from which the super composite was obtained. The description of the station representing the super composite must contain the description of the area of the super composite. The coordinates of the specific locations where the samples were collected to make the super composite must be recorded in the field notes for the collection of the super composite.

Surface Water Includes fresh or saline waters from water bodies such as streams, canals, rivers, lakes, ponds, bays and estuaries (natural or manmade).

Swing Sampler A pole designed to hold a one liter round intermediate sample bottle and a float, such as a fishing bobber, that is set to 0.5 m. Use when sampling from the bank or side of a body of water.

System Audit A qualitative on-site review and evaluation of a laboratory or field operation quality assurance system, and physical facilities utilized for sampling, sample processing, calibration and measurement or analysis.

Total Depth is the depth to the bottom of the water body or water column being sampled, surface water is measured in meters.

Trigger Volume A calculated volume of water (e.g., million cubic feet) designated as an appropriate amount to prompt the collection of a sample aliquot.

Van Dorn A water quality sampling device, which allows for discrete water samples to be taken at various depths. Consists of plastic cylinder with stoppers at each end in order to allow water into the device and to seal the bottle completely. This device is used to collect water samples at a desired depth without the danger of mixing with water from other depths. (a.k.a. Niskin).

Year Refers to the calendar year which runs from January 1st to December 31st. the Term "Year" has this meaning in all WQMS QS documents and records.

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Appendix 2: WQMS steps to create a log file on the YSI ProDSS

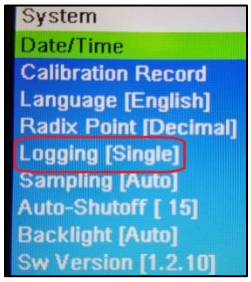
(ProDSS software version 1.1.8 or newer)

Initial Pre-Trip Site List (P-number) Setup

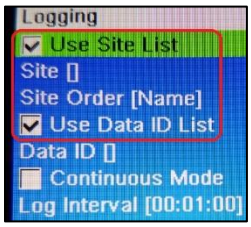
➔ *Set up the Site List one time on handheld, then only add P-numbers for future trips:*

1. Press the 'System' button on the YSI ProDSS

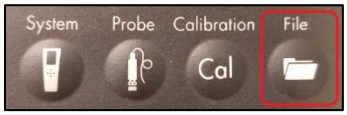
   a. From the System menu select 'Logging [Single]'.



   b. From the Logging menu make sure that 'Use Site List' and 'Use Data ID List' boxes are checked. If they are not, scroll down and press 'Enter' to check the boxes.



2. Press the 'File' button on the YSI ProDSS handheld.



   a. From the Files menu select 'Site []'.

   b. From the Site List menu select 'Add new…'

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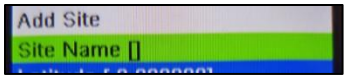
c. From the Site Name [] menu select 'Site Name []'

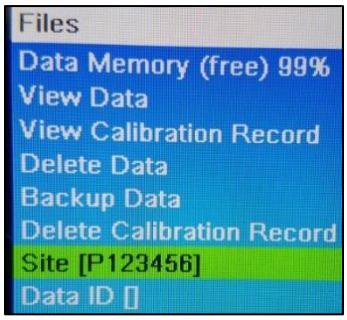


d. Type in your P-number with a capital 'P' (select 'SHIFT' to capitalize letters) and select 'Enter' when you are done.

e. In the Add Site menu, scroll down and select 'Save'.

f. From the Site List menu, scroll down and select your P-number.

g. In the Site menu, your P-number will automatically be highlighted. Press 'Enter' to select your P-number and you will return to the Files menu.



h. Press 'Esc' to return to the Home Screen.

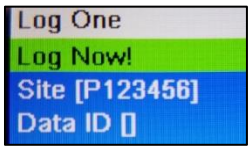
Initial Pre-trip Data ID List (Dash Numbers) Setup

➔ *Setup Data ID List one time on handheld, then only add P-numbers for future trips:*

1. Press the 'Enter' button on the YSI ProDSS handheld.

2. From the Log One menu, 'Site [Pxxxxxx]' and 'Data ID []' should be displayed.

Return to TOC



a. The Site [Pxxxxxx] should match your P-number.

b. Set up the Data ID list for current trip and future trips.

   i. Select 'Data ID []'

   ii. From the Data ID List menu select 'Add new…'

      1. Type in the first dash number of your trip, then select 'Enter'.

      2. Repeat this step until there are at least 30 subsequent Data ID numbers (e.g., 1, 2, 3, …). This list of Data ID numbers will now appear whenever a new Site (P-number) is added to the Site List.

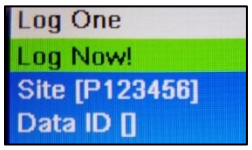
      3. Press 'Esc' twice to return to the Home Screen.

Logging a Sample

➔ *Remember to check your dash number before going out to the site to log field parameters:*

1. Once the instrument has been deployed and the readings have stabilized, press the 'Enter' button on the YSI ProDSS handheld.

2. From the Log One menu, the 'Site [Pxxxxxx]' and 'Data ID []' should be displayed.



   a. The Site [Pxxxxxx] should match your P-number. *If the Site name does not match your P-number*:

      i. Scroll down and select 'Site [Pxxxxxx]'.

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ii. Scroll down and select your P-number from the list. You will automatically return to the Site menu with your P-number highlighted. Press 'Enter' to select your P-number and automatically return to the Log One menu.

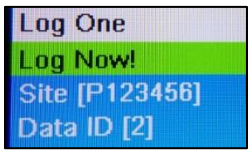
b. Check that the Data ID matches your dash number. *If the Data ID does not match your dash number:*

i. Scroll down and select Data ID [].

ii. Scroll to the Data ID number that matches your dash number and select it.

iii. 'Select [x]' will be highlighted in the Data ID List menu. Press 'Enter' to select the Data ID and automatically return to the Log One menu.

3. Select 'Log Now!



4. Ensure the message "Sample Logged" appears at the bottom of the screen. If it does not, restart the handheld and repeat the logging process.

5. Repeat the logging process at the next site by changing the Data ID number to match your dash number. Always change the Data ID number at a new site; otherwise, there will be multiple records for the same Data ID.

Retrieving the Log File

1. Connect one end of the On-The-Go Micro USB adapter to the charging port on the top of the ProDss handheld, then connect the other end to a USB drive.

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2. Press ‘File’ on the YSI ProDSS handheld.

3. From the Files menu select ‘Backup Data’.

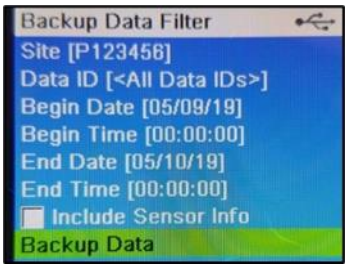
4. From Backup Data Filter menu, set up the Site, Begin Date, Begin Time, End Date, and End Time.

    a. Select ‘Site [<All Sites>]. Scroll down and select the correct P-number for your trip.

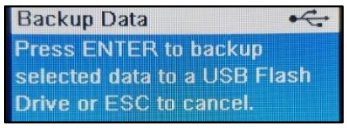
    b. From the Backup Data Filter menu, check that the ‘Begin Date’ is correct. If it is not, select it and adjust it using the format MM/DD/YY. Select Enter to return to the Backup Date Filter menu.

    c. Bracket the ‘Begin Time’ and ‘End Time’ to include all the data collected during your trip. Scroll down to each and adjust using the 12-hour format (00:00:00 AM/PM).

    d. Select ‘Backup Data.



5. When the Backup Data screen appears, press ‘Enter’ to backup the data to the flash drive.



6. Insert the flash drive into a computer and open the backed-up file to ensure all the data was transferred properly. Save the file by the following naming convention:

Pxxxxxx-YYYY-MM-DD.xlsx

(e.g., P123456-2019-05-22.xlsx)

7. Place the file in the ProDSS folder in the QA Data Dropbox located at:

\\ad.sfwmd.gov\dfsroot\data\kb_wqm_Data_Dropbox\PRO DSS

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Future Site List (P-number) Setup

1. Press the ‘File’ button on the ProDSS handheld.
2. From the Files menu select ‘Site [Pxxxxxx]’.
3. Select ‘Add new…’
4. Select ‘Site name []’.
5. Type in your P-number with a capital ‘P’ and select ‘Enter’ when you are done.
6. Scroll down and select ‘Save’.
7. Scroll down and select your P-number.
8. ‘Select [Pxxxxxx] will be highlighted. Press ‘Enter’.
9. Scroll down and select ‘Data ID [x]’ to ensure that the 30 Data ID numbers you initially entered are listed.
10. Press ‘Esc’ until you return to the Home Screen and follow the directions for “Logging a Sample.”

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Appendix 3: Okeechobee DI system Daily Log

DI System Daily Log

Month/Year:

_____

DI Service Date/Initials:

_____

Notes:

DI system daily monitoring procedures:

- ☐ Flush the DI system each morning by opening both spigots in the lab for at least one minute
- ☐ Confirm that the lights on all three sensors are green
- ☐ Check that the UV filter light is on
- ☐ Record conductivity reading (specific conductance should be < 1 µS/cm)
- ☐ Record time and initial

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
DI room indicator light 1 is green? Y/N																
DI room indicator light 2 is green? Y/N																
Lab indicator light is green? Y/N																
UV light is on? Y/N																
Conductivity (< 1 µS/cm)																
Time																
Initials																

Date	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
DI room indicator light 1 is green? Y/N															
DI room indicator light 2 is green? Y/N															
Lab indicator light is green? Y/N															
UV light is on? Y/N															
Conductivity (< 1 µS/cm)															
Time															
Initials															

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Appendix 4 Annual Verification of Boat Electronic Depth Sensors Form

Annual Verification of Boat Electronic Depth Sensors

Vessel and Device: Metal Shark – Garmin GPSMAP 7607xsv

Refer to the Instrument Measurement Requirements and Guidelines section of the FSM (SFWMD-FIELD-FSM-001) for documentation requirements.

Depth Sensor S/N: _____ **Date of Last Verification:** _____

Date: _____ **Time:** _____ **Verification Location:** _____

Person(s) Performing Verification: _____

Depth Measurements Reference Device: Measuring Tape *P/F Acceptance Criteria: 10%*

Depth	Measuring Tape	Sensor	P/F	Depth	Measuring Tape	Sensor	P/F
1				6			
2				7			
3				8			
4				9			
5				10			

Comments:

Depth Sensor S/N: _____ **Date of Last Verification:** _____

Date: _____ **Time:** _____ **Verification Location:** _____

Person(s) Performing Verification: _____

Depth Measurements Reference Device: Measuring Tape *P/F Acceptance Criteria: 10%*

Depth	Measuring Tape	Sensor	P/F	Depth	Measuring Tape	Sensor	P/F
1				6			
2				7			
3				8			
4				9			
5				10			

Comments:

Return to TOC

Annual Verification of Boat Electronic Depth Sensors

Vessel and Device: Whaler – Garmin echoMap 94sv

Refer to the Instrument Measurement Requirements and Guidelines section of the FSM (SFWMD-FIELD-FSM-001) for documentation requirements.

Depth Sensor S/N: _____ **Date of Last Verification:** _____

Date: _____ **Time:** _____ **Verification Location:** _____

Person(s) Performing Verification: _____

Depth Measurements Reference Device: Measuring Tape ***P/F Acceptance Criteria: 10%***

Depth	Measuring Tape	Sensor	P/F	Depth	Measuring Tape	Sensor	P/F
1				6			
2				7			
3				8			
4				9			
5				10			

Comments:

Depth Sensor S/N: _____ **Date of Last Verification:** _____

Date: _____ **Time:** _____ **Verification Location:** _____

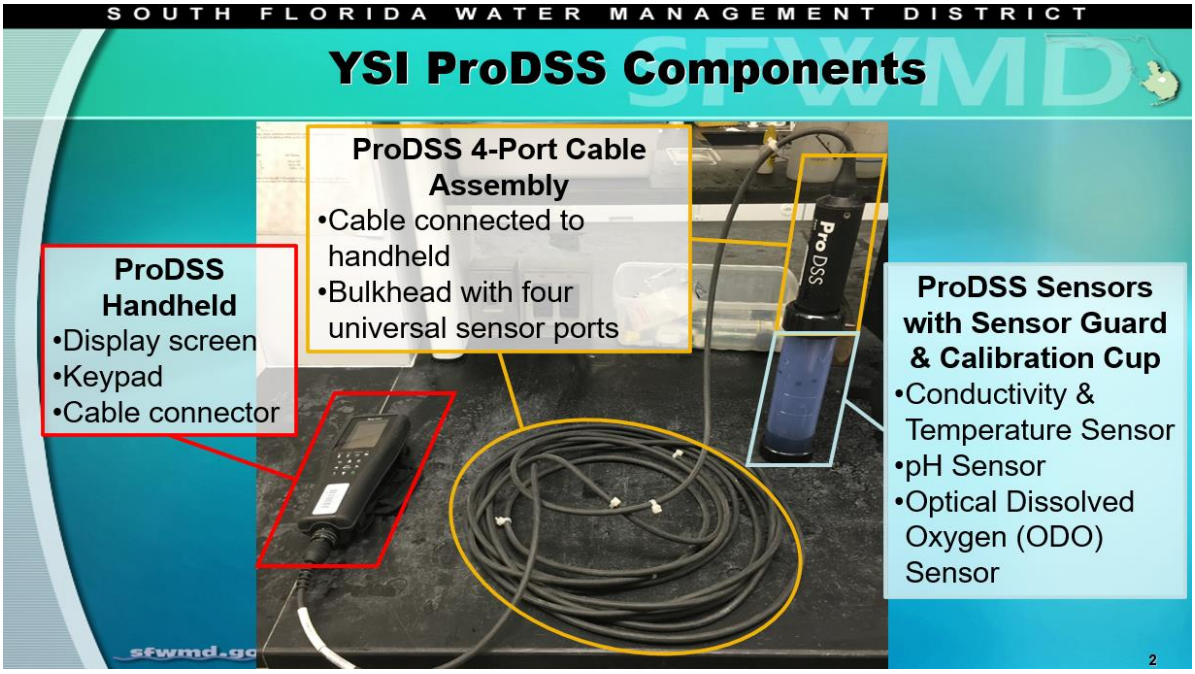
Person(s) Performing Verification: _____

Depth Measurements Reference Device: Measuring Tape ***P/F Acceptance Criteria: 10%***

Depth	Measuring Tape	Sensor	P/F	Depth	Measuring Tape	Sensor	P/F
1				6			
2				7			
3				8			
4				9			
5				10			

Comments:

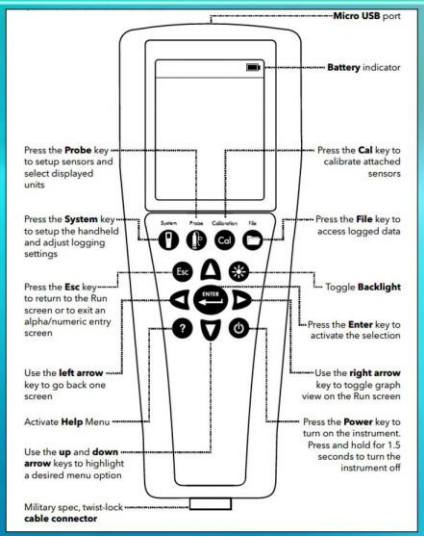
Appendix 5: Introductory Guide for Calibration



Return to TOC

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Becoming Familiar with the ProDSS Handheld



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Pre-trip Initial Calibration (IC) and Initial Calibration Verification (ICV)

1. Specific Conductance
   a) Initial Calibration (IC) – higher value (e.g., 2000 or 1800)
   b) Initial Calibration Verification (ICV)* – lower value (e.g., 200 or 100)

2. pH
   a) Initial Calibration 1 (IC1) – pH 7
   b) Initial Calibration 2 (IC2) – pH 4 *or* pH 10

3. Dissolved Oxygen
   • Initial Calibration (IC) – based on ambient temperature

*DO NOT calibrate again!
This is a verification only (record value off Run screen).

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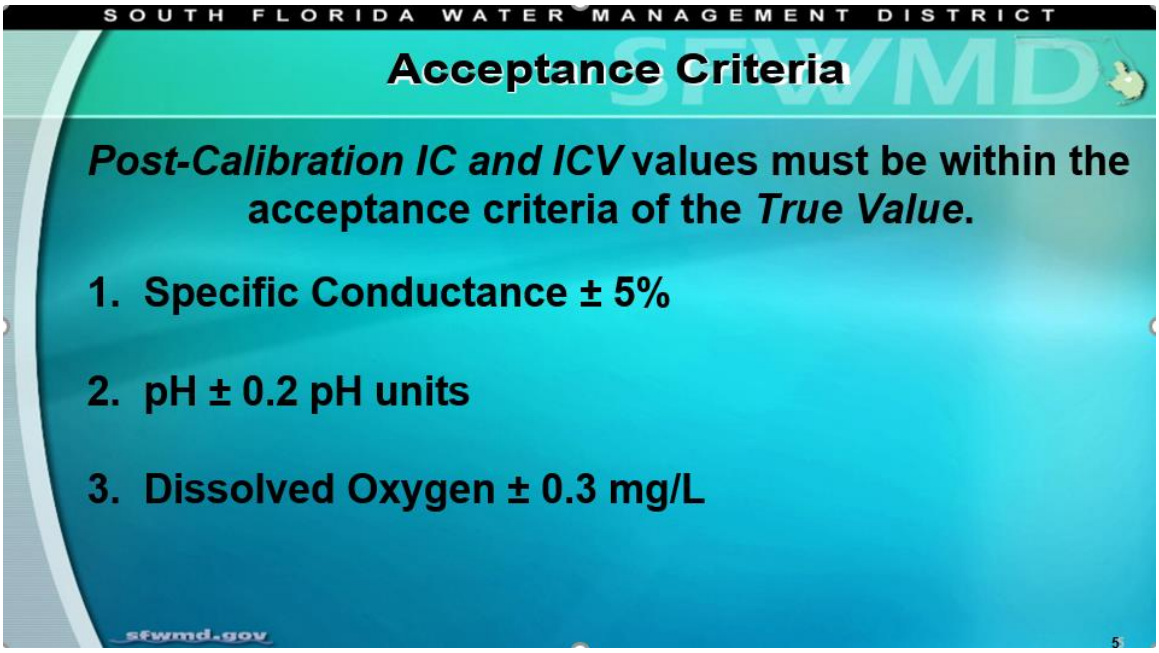

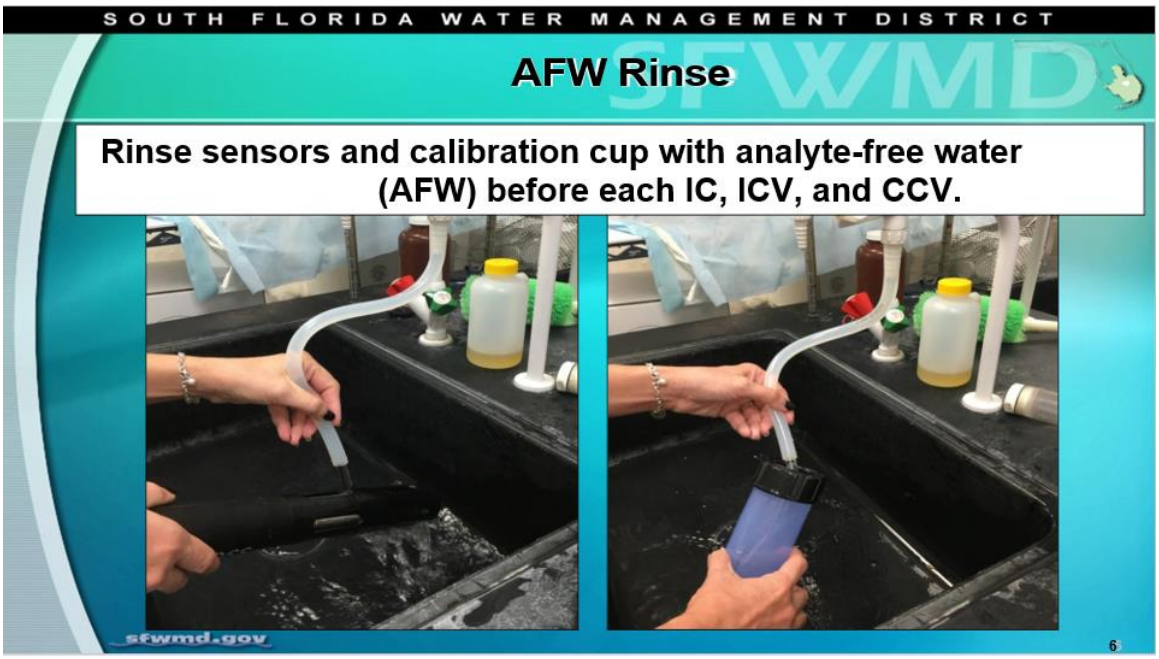

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Specific Conductance Initial Calibration (IC)

*FOSL #4422 may use a different value

- Thoroughly rinse the cup and sensors at least once with the conductivity standard solution for the IC (high value first, e.g., 2000 µS/cm*).
- Discard the standard solution that is used for the rinse.
- Fill cup to the **second** fill line with standard solution of the same value that was used for the rinse(s).

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Specific Conductance Initial Calibration (IC)

- Place the sensors in cup.
- Make sure the standard solution is completely covering the top vent hole of the combined Conductivity/Temperature sensor.
- Tap cup on counter to remove bubbles.

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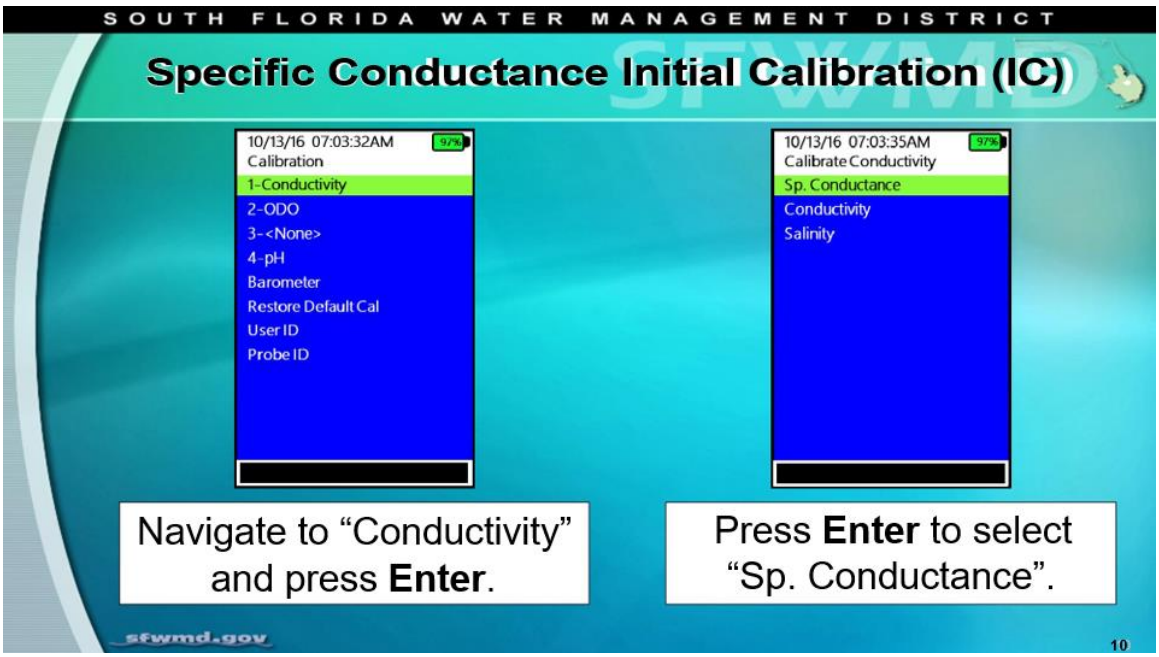
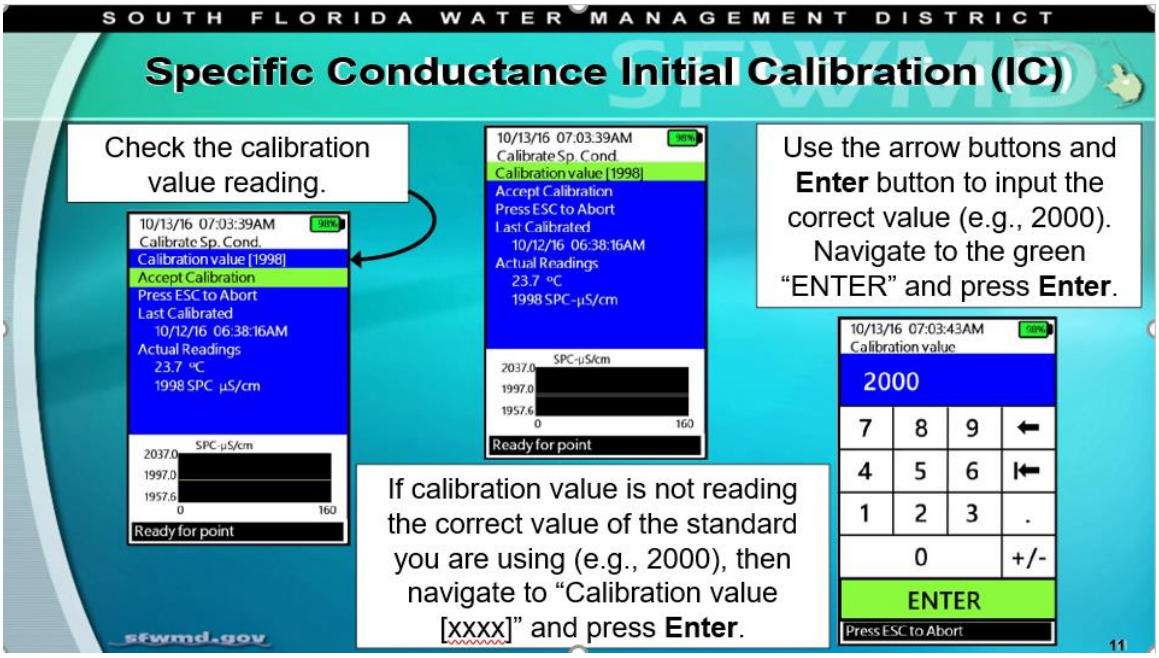
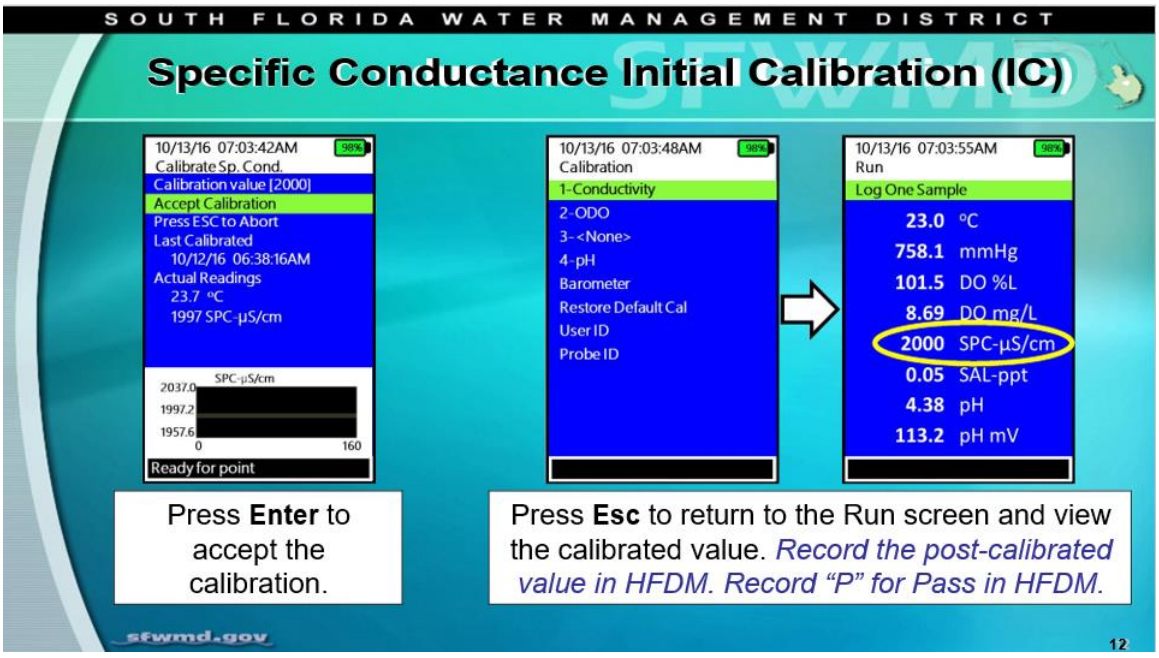


Return to TOC





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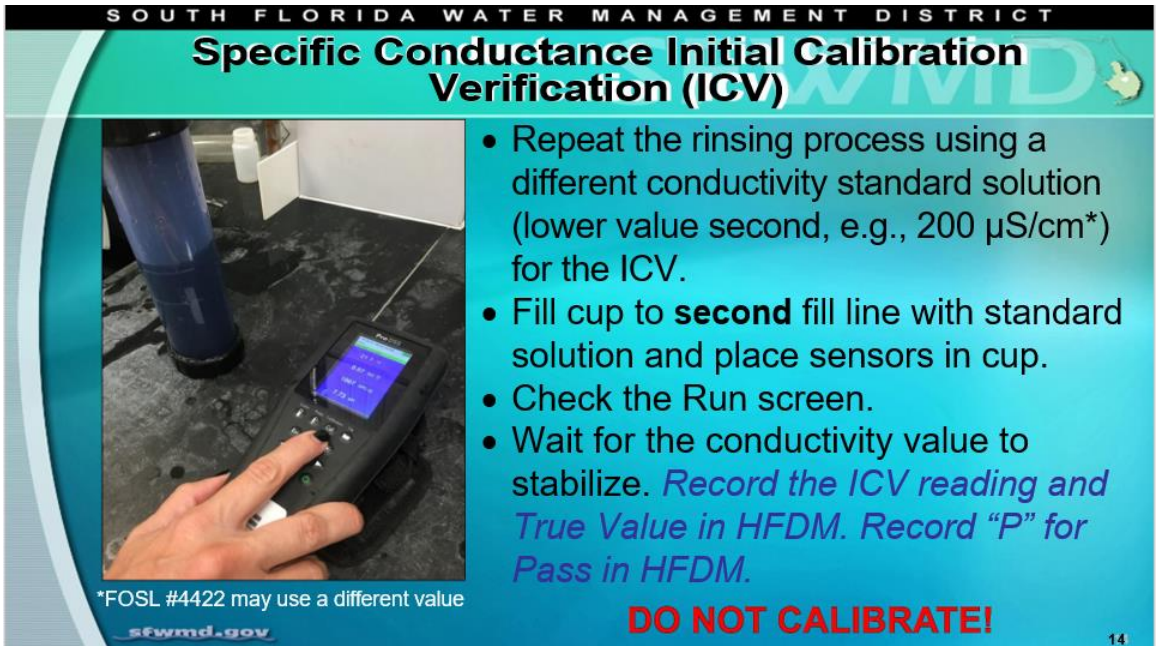

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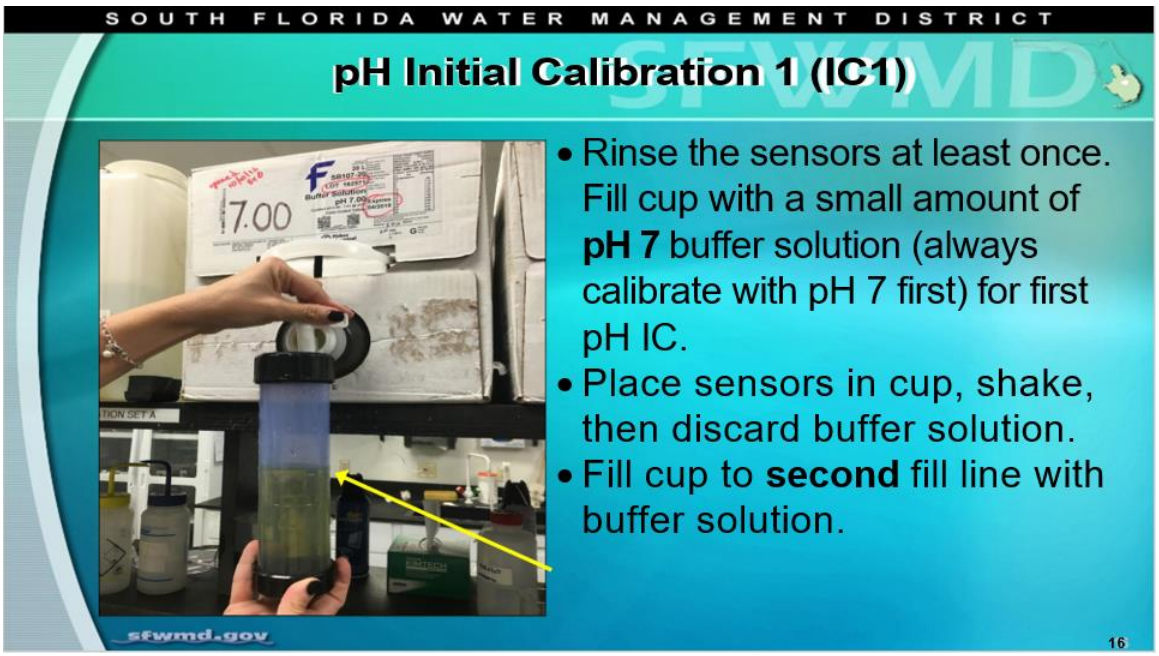

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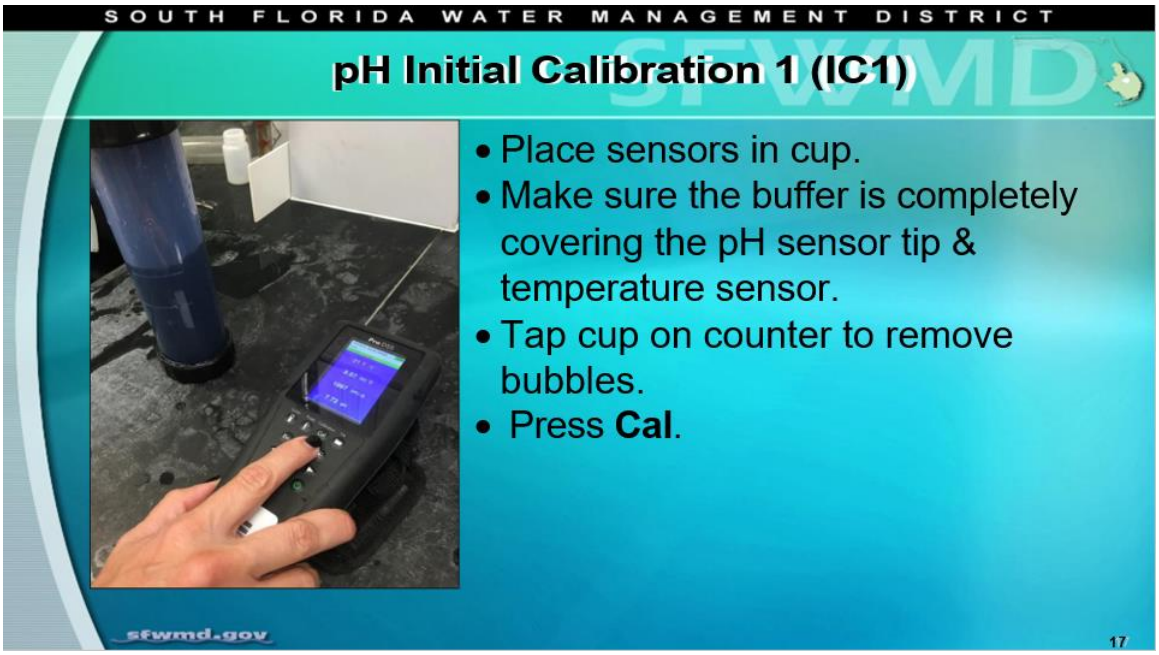

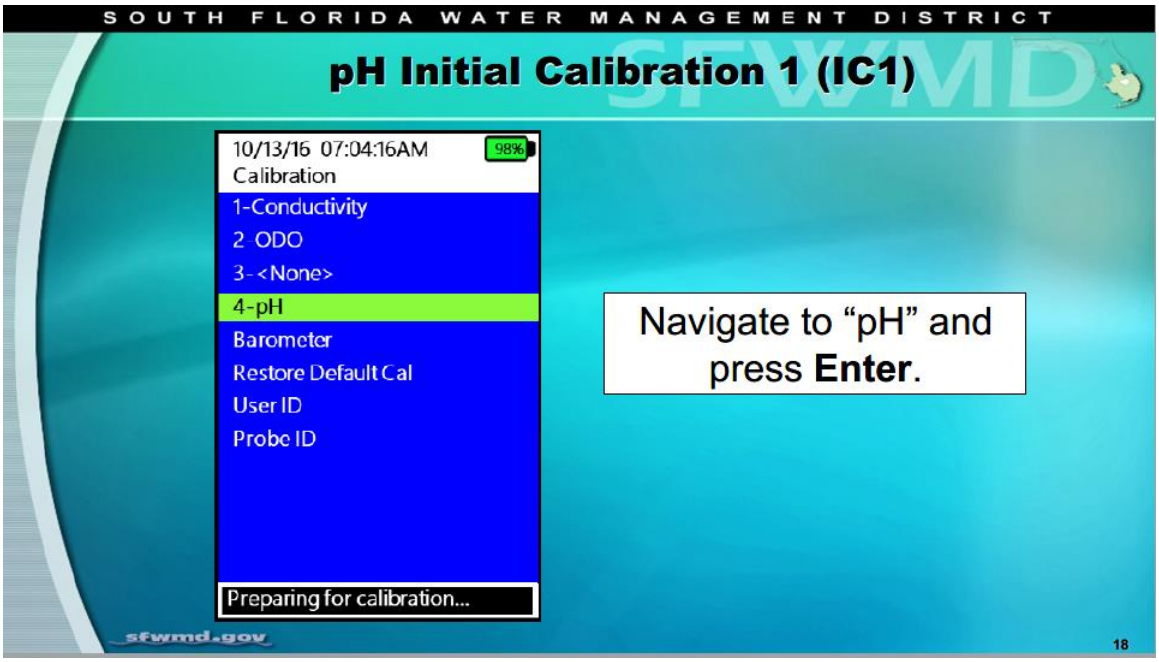

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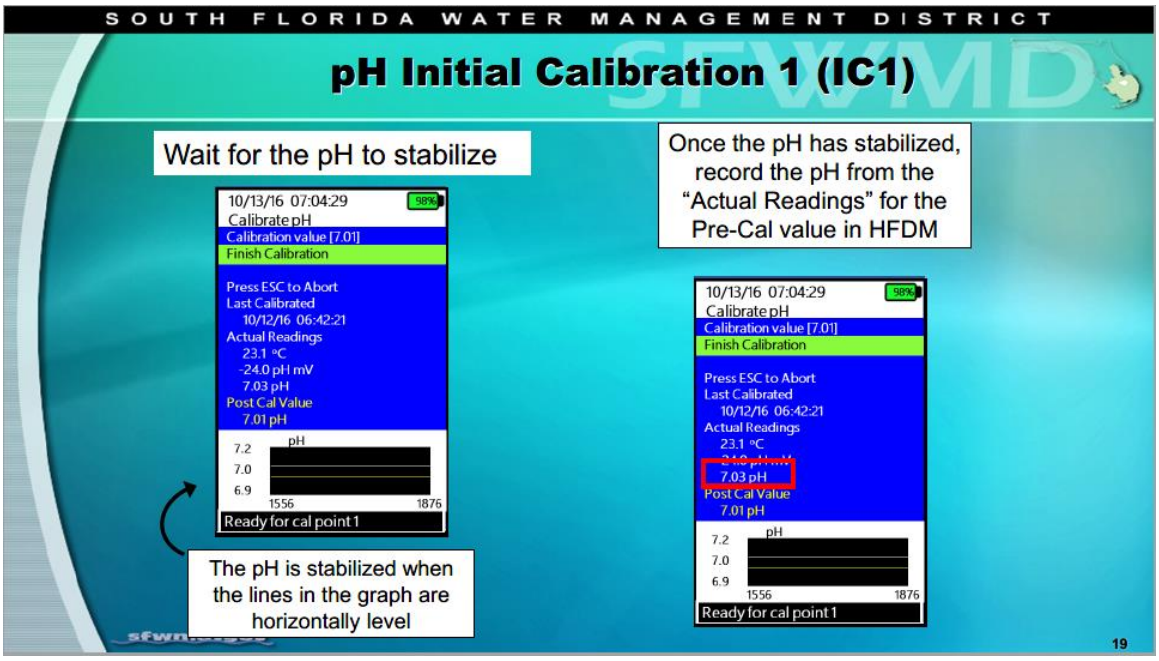

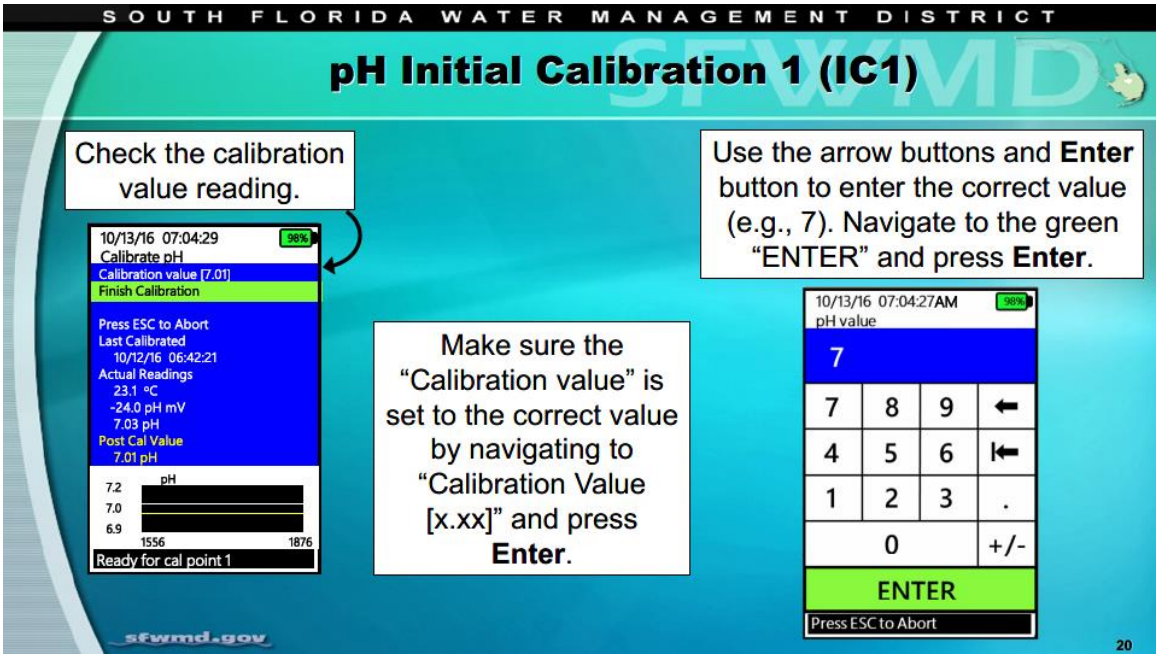

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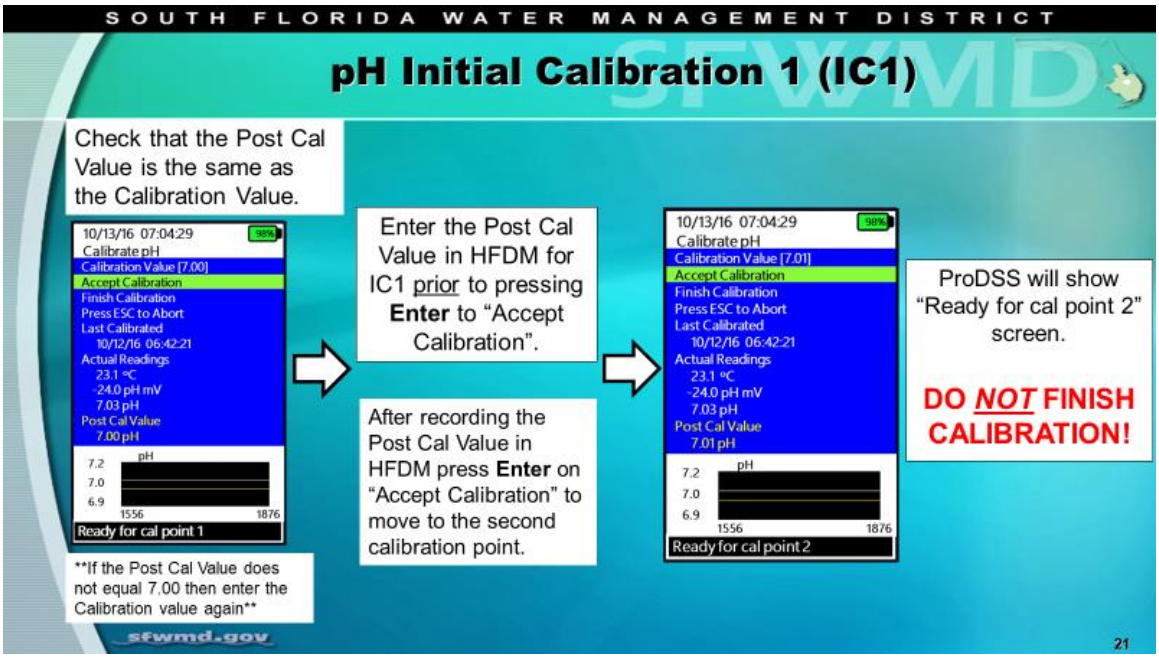

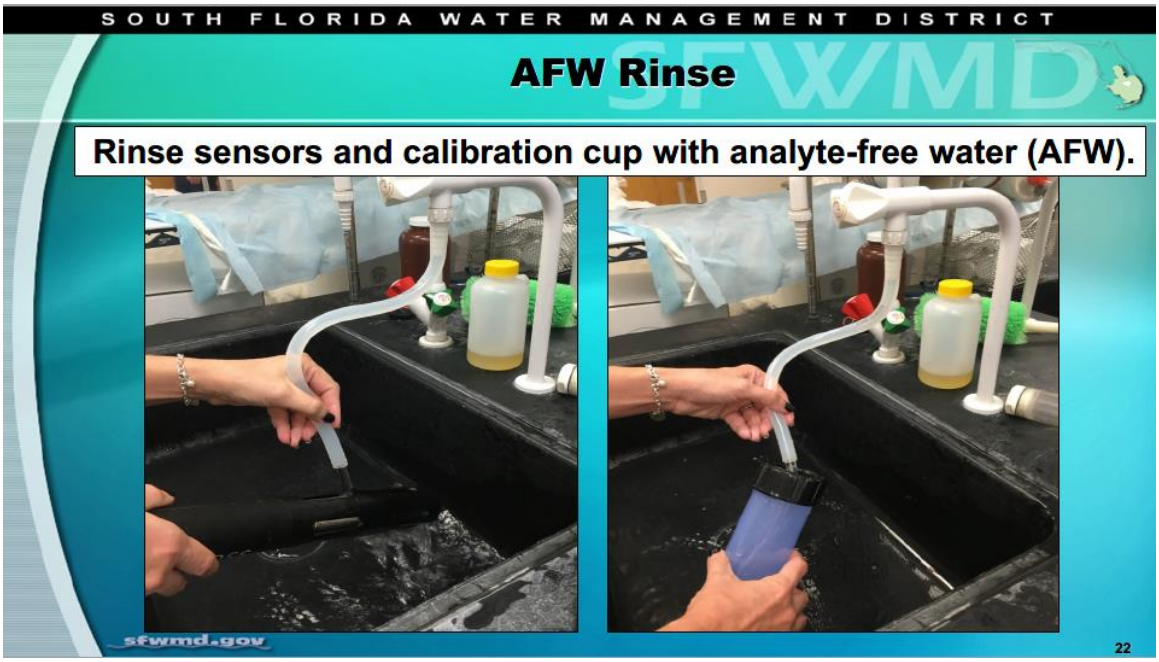

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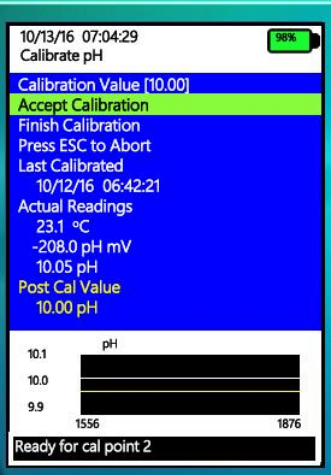
SOUTH FLORIDA WATER MANAGEMENT DISTRICT

pH Initial Calibration 2 (IC2)



- Repeat the rinsing process using a buffer solution for a different pH value (either pH 4 or pH 10) for the second IC.
- Fill cup to the second fill line with pH buffer solution and place sensors in cup.
- Repeat the previous steps for the second pH IC (pH 10 is shown in this example).
- After making any necessary changes to the “Calibration Value” navigate to “Accept Calibration” and press **Enter**.
- ProDSS will show “cal point 3” screen.
- Select “Finish Calibration”.
- Return to the Run screen and record the pH value for the Calibrated value in HFDM. Record “P” for Pass in HFDM

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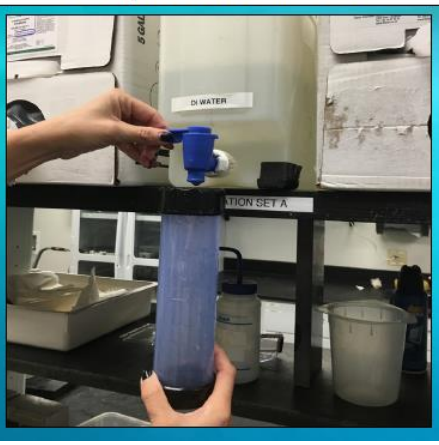
Ambient Temperature Water Rinse

Rinse sensors and calibration cup with ambient temperature water.



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Dissolved Oxygen Initial Calibration

- Remove the calibration cap and sensor guard from sonde.
- Dry off the DO sensor cap and temperature sensor with a kim wipe to ensure there are no water droplets on
- Put the sensor guard back on the sonde
- Fill cup with a small amount of ambient temperature water (~1 inch of water).
- Place sensors in cup.
- Make sure the water is **NOT** touching the ODO sensor.
- Tap cup on counter to remove bubbles.
- **DO NOT** tighten the cap.
- Place the cup and sensors so they are sitting perpendicular to the counter.

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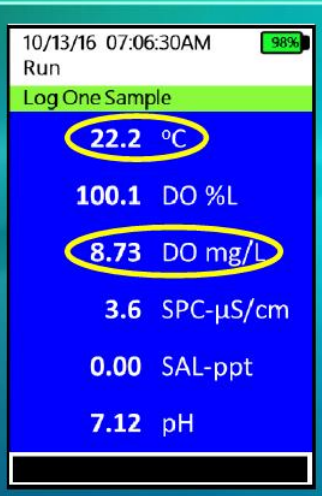
Dissolved Oxygen Initial Calibration (IC)



- Check the Run screen.
- Wait for the temperature and DO mg/L values to stabilize.
- *Record DO pre-calibration value in HFDM.*
- Press **Cal**.

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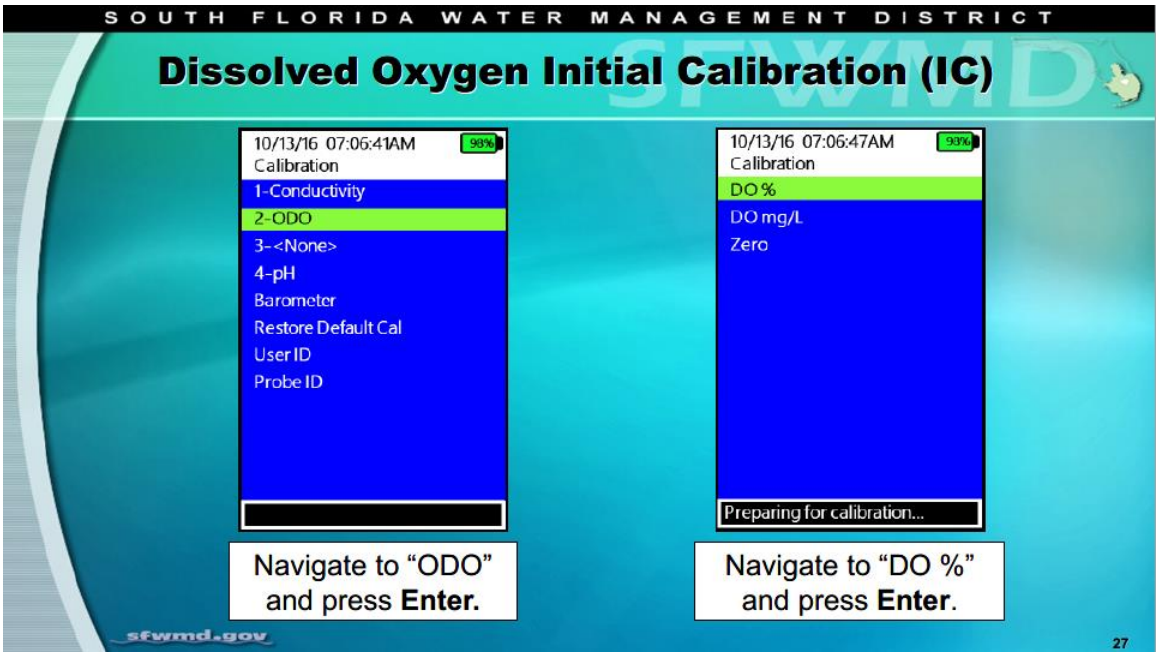
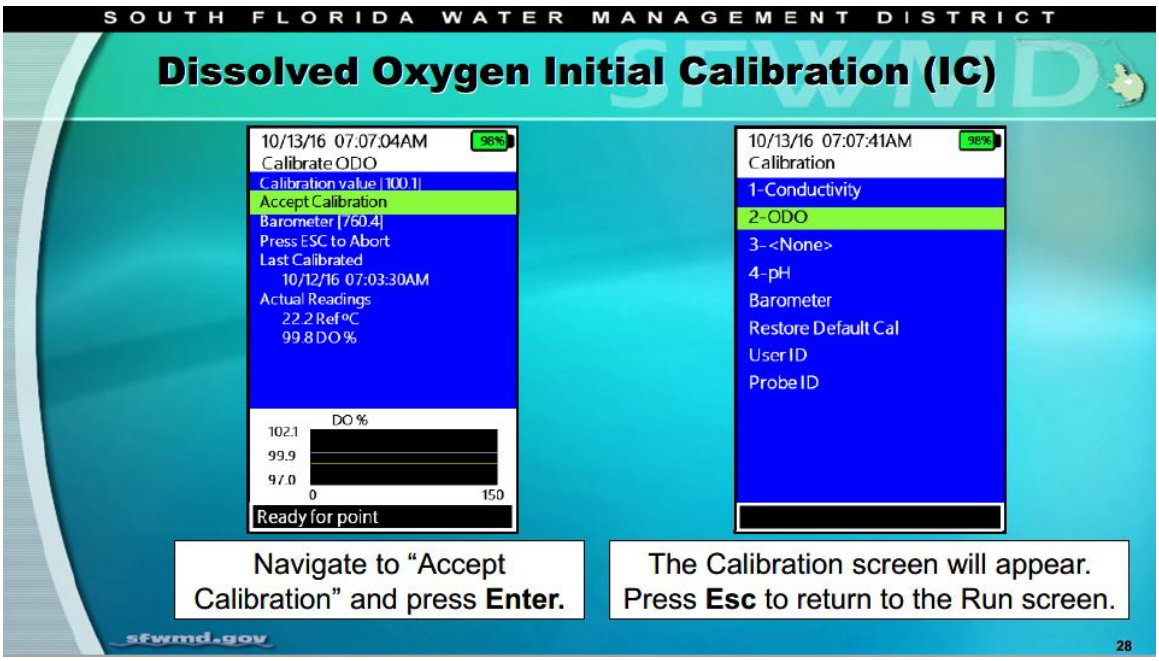
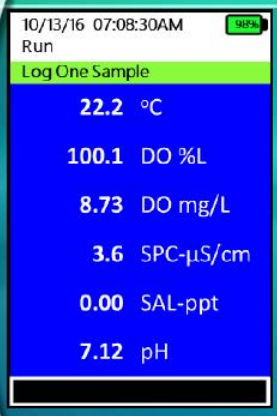




Return to TOC

SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Dissolved Oxygen Initial Calibration (IC)



- After calibrating, *record the Temperature (°C) and post-calibration value of DO (mg/L) in HFDM*.
- Use the *Dissolved Oxygen Saturation Chart* to locate the corresponding True Value of DO (mg/L) based on the recorded Temperature (°C).
- *Record the True Value of DO (mg/L)*, which must be rounded to the nearest tenth (see FSM *Section 6.8.1 DO IC* for rounding rules).
- The post-calibration DO value must be within ± 0.3 mg/L of the recorded True Value.

✓ **After all field parameters are calibrated, keep the sensors stored in the calibration cup with a small amount if tap water for transport into the field.**

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SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Post-trip Continuing Calibration Verification (CCV)

- **Continuing Calibration Verification (CCV) is performed after a trip.**
- **Complete the CCV by repeating the order of the Pre-trip IC/ICV.**
- **You MUST bracket Specific Conductance and pH. Confirm the range of the values that were recorded for Specific Conductance and pH during the trip. This range will determine your "bracket" for the CCV of these parameters.**
- **DO NOT calibrate again! View standard, buffer, and DO mg/L values from the Run screen and record into HFDM.**
- **Follow the same Acceptance Criteria ranges for the CCV as you did for the IC/ICV.**

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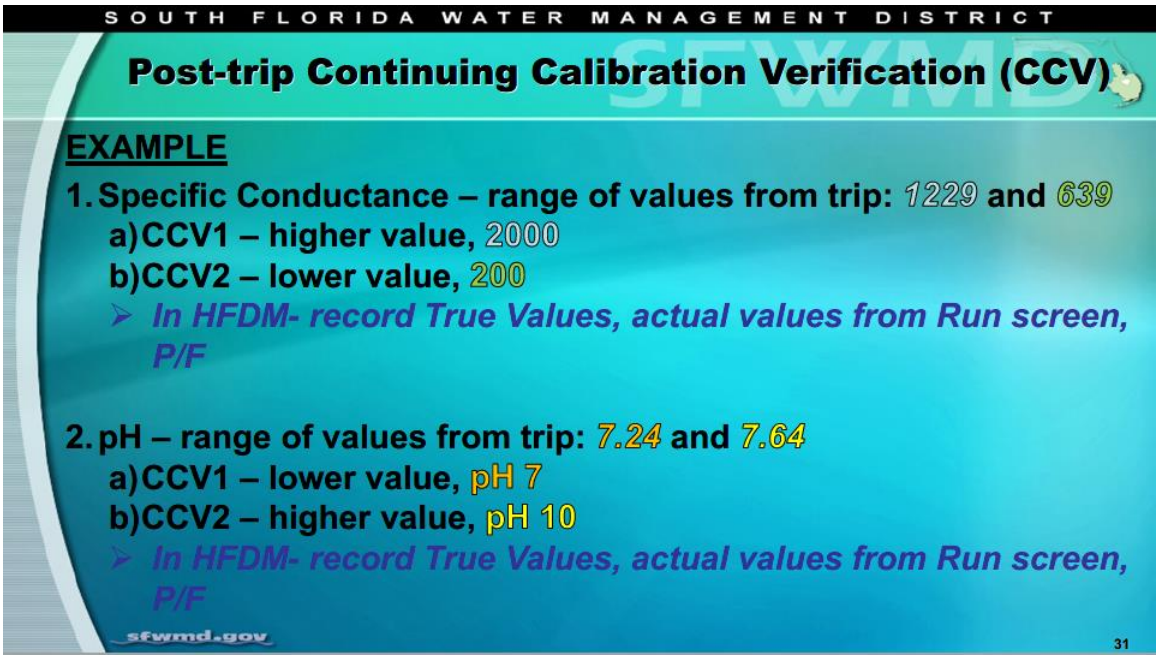
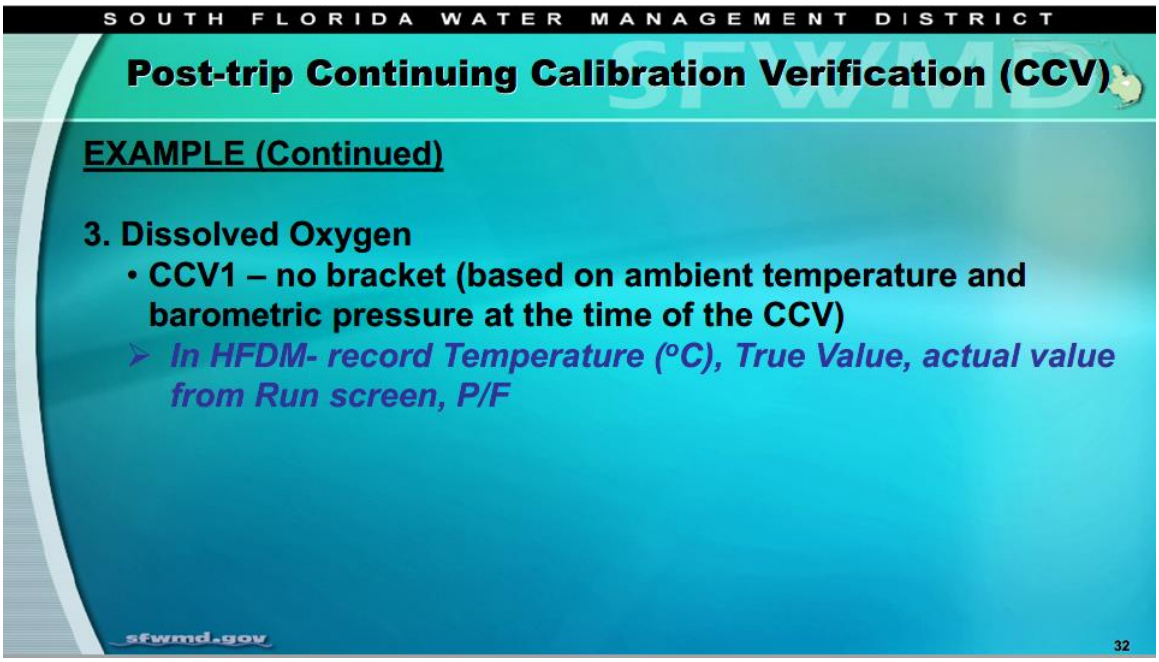
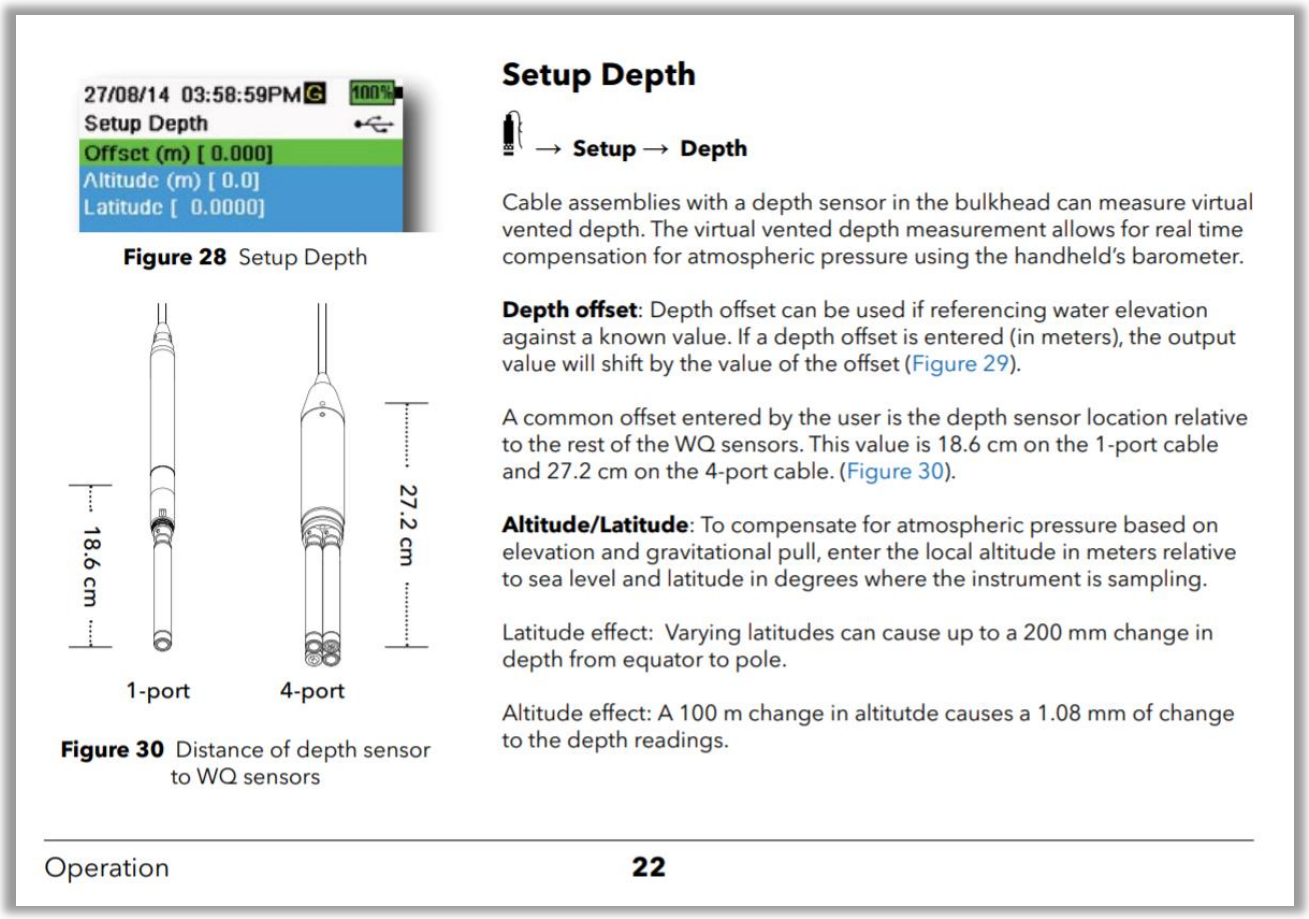




Return to TOC

YSI ProDSS Depth Offset



The depth sensor on the YSI ProDSS is located 0.272 meters above the Specific Conductance, pH and Dissolve Oxygen sensors. To facilitate recording the parameters at the correct display depth, without having to calculate the depth difference, one can simply setup an offset to have accurate readings compared to the display depth.

To do this, navigate to Probe -> Setup -> Depth on the device and make sure the offset is set to 0.272 meters, not 0.000 meters, which is the factory default. **NOTE:** Keep in mind that when collecting water parameters at less than 0.272 meters from the surface, the sensor will be exposed to air, resulting on an INCORRECT display depth.

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YSI ProDSS Depth Calibration

3.2 Depth

NOTE: *This calibration option is available only if your bulkhead is equipped with a depth sensor.*

Depth is calculated from the pressure exerted by the water column minus atmospheric pressure. Factors influencing depth measurement include barometric pressure, water density, and temperature. Calibration in the atmosphere "zeros" the sensor with respect to the local barometric pressure.

YSI recommends calibrating depth at the location of measurement. A change in barometric pressure will result in a zero shift unless the transducer is recalibrated to the new pressure.

If applicable, enter the depth offset to set the depth measurement to something other than zero. Enter the altitude and latitude of your sampling location to increase the accuracy of your depth measurement.

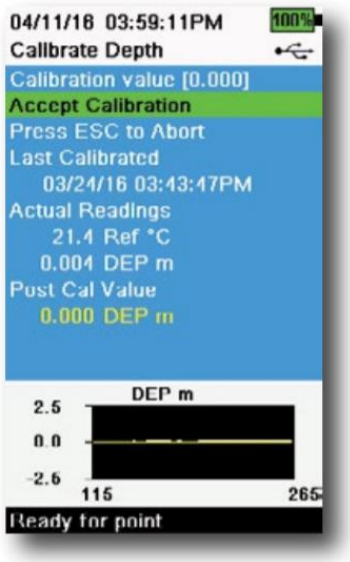

Figure 48 Calibrate Depth

Depth Calibration

1. Make sure that the depth sensor is clean and dry in air, not immersed in any solution. For best results, keep the bulkhead still and in one position while calibrating.
2. Push the (Cal) key, then select **Depth**. The **Calibration Value** is set to 0.000 and should not be changed for air calibrations, even if using an offset.
3. Observe the actual measurement readings for stability (white line on graph shows no significant change for 40 seconds), then select **Accept Calibration** (Figure 48).

If the depth offset is used, the depth measurement will be adjusted after calibration.

To calibrate the YSI ProDSS Depth navigate to Calibration -> Depth on the device.

- Ensure the depth sensor is clean and in air. Keep the probe still and in one position during calibration.
- Set the calibration value to 0.000 m (air calibration).
- Make sure measurements are stable for 40 seconds, then select "Accept Calibration".
- For the depth Initial Calibration Verification (ICV), make sure the values read 0.272 meters in air, after the calibration.
- For the depth Continuous Calibration Verification (CCV), make sure the values read 0.272 meters in air, before starting other CCV checks in the laboratory.

Return to TOC

Appendix 6: Analytical Methods and Default QA/QC Targets for WQMS

Analyte	PQL	MDL	Units
Minerals			
Alkalinity, total as Calcium Bicarbonate ($CaCO_3$)	4	1	mg/L
Calcium, dissolved (Ca) and total	1.2	0.3	mg/L
Chloride (Cl)	1.0	0.5	mg/L
Hardness (as $CaCO_3$)	4	1	mg/L
Magnesium, dissolved (Mg)	0.4	0.1	mg/L
Potassium, dissolved (K)	0.4	0.1	mg/L
Silica, dissolved (SiO2)	0.2	0.05	mg/L
Specific Conductance	8	2	µS/cm
Sodium, dissolved (Na)	1.6	0.4	mg/L
Sulfate (SO_4)	0.4	0.1	mg/L
Total Dissolved Solids (TDS)	100	25	mg/L
Nutrients			
Ammonia-Nitrogen (NH_3-N)	0.010	0.005	mg/L
Nitrate (NO_3) - N	0.010	0.005	mg/L
Nitrate and Nitrite (NO_3) - N	0.010	0.005	mg/L
Nitrite (NO_2) - N	0.004	0.002	mg/L
Orthophosphate (O-PO_4) - P	0.008	0.002	mg/L
Total Nitrogen and Total Dissolved Nitrogen (TN and TDN)	0.1	0.05	mg/L
Total Phosphorus (TP)	0.004	0.002	mg/L

Return to TOC

Analyte	PQL	MDL	Units
Demands			
Organic Carbon, dissolved (DOC)	2	0.8	mg/L
Organic Carbon, total (TOC)	2	0.8	mg/L
Trace Metals			
Aluminum, total and dissolved (Al)	16	8	µg/L
Copper, total and dissolved (Cu)	8	2	µg/L
Iron, total and dissolved (Fe)	6	3	µg/L
Strontium, dissolved (Sr)	0.6	0.3	µg/L
Zinc, total and dissolved (Zn)	8	4	µg/L
Wet Chemistry			
Color	4	1	PCU
pH, laboratory	NA	NA	Units
Total Suspended Solids (TSS) [6]	12	3	mg/L
Turbidity, laboratory	0.4	0.1	N.T.U.
Volatile Suspended Solids (VSS) [6]	12	3	mg/L
Total Solids [5]	NA	NA	mg/L
Biological			
Alkaline Phosphatase	4	1	nM/minmL
Chlorophylls HPLC, Chlorophyll a [1]	4	1	µg/L

Return to TOC

Analyte	PQL	MDL	Units
Chlorophylls HPLC, Chlorophyll b[1]	4	1	µg/L
Chlorophylls HPLC, Pheophytin A[1]	2	0.5	µg/L
Soil/Sediment/Tissue			
Aluminum, total recoverable in Biological Tissue[2]	150	37.5	mg/kg
Aluminum, total recoverable in Sediment / Plant[2]	150	37.5	mg/kg
Ash & Ash Free Dry Weight	4	1	%
Calcium, total recoverable in Sediment / Plant[2]	500	125	mg/kg
Copper, total recoverable in Biological Tissue[2]	6	1.5	mg/kg
Copper, total recoverable in Sediment[2]	6	1.5	mg/kg
Corrosivity (pH)	NA	NA	Units
Iron, total recoverable in Sediment / Plant[2]	150	37.5	mg/kg
Magnesium, total recoverable in Sediment / Plant[2]	400	100	mg/kg
Percent Moisture	NA	NA	%
Phosphorus, total recoverable in Sediment / Plant[2]	80	20	mg/kg

Return to TOC

Analyte	PQL	MDL	Units
Potassium, total recoverable in Sediment / Plant[2]	200	50	mg/kg
Total Carbon in Sediment / Plant[3]	0.8	0.2	%
Total Mercury in Biological Tissue[4]	0.008	0.002	mg/kg
Total Mercury in Sediment[4]	0.016	0.004	mg/kg
Total Nitrogen in Sediment / Plant[3]	0.8	0.2	%
Total Organic Carbon in Sediment / Plant[3]	0.8	0.2	%
Total Sulfur in Sediment / Plant[2]	400	100	mg/kg

RPD – Relative Percent Difference
SM – Standard Methods; available online at http://www.standardmethods.org/
ISO – International Organization of Standardization
NA = Not applicable, no published criteria exist
1 – Based on 450 mL of filtrate and 8mL of extraction solution
2 – Based on 0.1 g of digested material
3 – Based on 10 mg of sample
4 – Based on 0.15 g of sample
5 – Based on 15mL of sample
6 – TSS/VSS SRM limits acceptance limits are set by the manufacturer and are adjusted on a lot to lot basis
Please note that in some cases reported MDLs and PQLs may differ from FDEP to better assist our clients and optimization for District programs, permits and production.

Return to TOC

Appendix 7: Investigation Form

Investigation Form

☐ **Sample Mix-up** ☐ **Improper Preservation** ☐ **Other Problems**

Problem reported by: _____ Date: _____

Project: _____ Site name: _____

Lab ID(s) #: _____ , _____ , _____ , _____

P Number(s)#_____ , _____ , _____ , _____

Date & Time of collection: _____

Collector(s): _____

_____

Describe the problem: _____

_____

_____

Circle bottle(s) affected:

Magenta	Beige	Yellow	Orange	Light Blue
Bright Blue	White	Grey	Green	Black

Are sample IDs correct in the header sheet? _____Yes _____ No Explain: _____

Are alternative bottles (beige/white, light blue/grey for grabs, magenta/grey for autosampler) available?

_____ Yes _____ No _____ NA If yes, has the laboratory analyzed out of the alternative bottle?

_____ Yes _____ No Explain: _____

Has the field staff been contacted to correct the problem? _____Yes Explain: _____

_____ No Explain: _____

Final Corrective action: _____

_____

_____

_____

Was acid added? _____ Yes _____ No If yes: _____ Sulfuric Acid _____ Nitric Acid

Lot number: _____ Expiration date: _____ How many drops: _____

Added by: _____ Signature: _____

Lab Investigation: _____ Print: _____ Date: _____

Lab Supervisor: _____ Print: _____ Date: _____

Field Representative: _____ Print: _____ Date: _____

Return to TOC

Appendix 8: Temporary Sample Access Request Form

Temporary Sample Access Request Form

Requested by (print): _____ Date: _____

Signature: _____ Contact info: _____

Project: _____ Site name: _____ Remedy ticket #: _____

Laboratory ID(s) #: _____, _____, _____, _____

P# _____, _____, _____, _____

Date of collection: _____ Date received at laboratory: _____

Describe the reason for access:

_____

_____

_____

Circle bottle(s) to be accessed:

Magenta Beige Yellow Orange Light Blue

Bright Blue White Grey Green Black

Access approved by Laboratory Manager or Delegate (laboratory supervisor, Section Administrator or AS QA Officer):

Name: _____ Signature: _____ Date: _____

Time and Date of access:

Date: _____ Start Time: _____ End Time: _____

Notes of accessor: _____

_____

Resolution: _____

Accessed by (Field): _____ Signature: _____ Date: _____

Access witnessed by (Lab): _____ Signature: _____ Date: _____

Approving Supervisor (Field): _____ Signature: _____ Date: _____

Process completed (Laboratory Manager) Signature: _____ Date: _____

Return to TOC

Appendix 9: WQMS Signature Log

South Florida Water Management District

Water Quality Monitoring Section (WQM)

Signature Log

Name	Collector ID	Signature	Initials	Date

Return to TOC

Appendix 10: Table FT 1500-1: Solubility of Oxygen in Water at Atmospheric Pressure

Table FT 1500-1: Solubility of Oxygen in Water at Atmospheric Pressure[1,2]			
Temperature °C	Oxygen Solubility mg/L	Temperature °C	Oxygen Solubility mg/L
0.0	14.621	26.0	8.113
1.0	14.216	27.0	7.968
2.0	13.829	28.0	7.827
3.0	13.460	29.0	7.691
4.0	13.107	30.0	7.559
5.0	12.770	31.0	7.430
6.0	12.447	32.0	7.305
7.0	12.139	33.0	7.183
8.0	11.843	34.0	7.065
9.0	11.559	35.0	6.950
10.0	11.288	36.0	6.837
11.0	11.027	37.0	6.727
12.0	10.777	38.0	6.620
13.0	10.537	39.0	6.515
14.0	10.306	40.0	6.412
15.0	10.084	41.0	6.312
16.0	9.870	42.0	6.213
17.0	9.665	43.0	6.116
18.0	9.467	44.0	6.021
19.0	9.276	45.0	5.927
20.0	9.092	46.0	5.835
21.0	8.915	47.0	5.744
22.0	8.743	48.0	5.654
23.0	8.578	49.0	5.565
24.0	8.418	50.0	5.477
25.0	8.263		

1. The table provides three decimal places to aid interpolation
2. Under equilibrium conditions, the partial pressure of oxygen in air-saturated water is equal to that of the oxygen in water-saturated

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Appendix 11 : Summary of Changes

Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
10	07/31/2019	Acronyms	Updated new terms for LIMS update and equated old terms to new terms
		Section 1	Added language establishing FSM document as a separate document from FSQM
		Section 2	FSQM section 2 omitted from F–M - moved to QM
		Table 3	Added: HOBO Bluetooth water level logger. Updated some instrument type numbers.
		Table 7	Omitted WMD low band radio, cell phone, SPOT from FSM
		3.0	Added: New equipment must be cleaned prior to use. If the equipment type or construction is different from equipment already used by WQM, an EB must be collected. (See Section 8.1)
		3.0	Added language clarifying documentation that must be filled out if decontamination takes place away from the base of operations
		3.1	Clarified information that must be documented for the AFW carboy checkout
		3.1	Modified: Non-disposable carboys are not used for normal WQM and WQM contractor operations.
		3.2.1	Added wording specifying spigots must be cleaned
		3.2.1	Clarified type of acid used to clean equipment
		3.2.1	Clarified steps for washing stainless steel equipment
		3.2.2	For offsite cleaning on overnight trips, the cleaning of the equipment must be documented including all the information listed above.
		3.3	Clarified what is meant “y "sea”ed"

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
		4.0.2	Clarified the language specifying that the samples must be processed on a clean surface included in the field cleaning process
		4.0.3	Clarified that gloves must be changed prior to collecting field QC blanks
		4.0.4.1	Added: Total Depth is also measured using a marked line with a weight attached.
10	7/31/2019	4.0.4.1	Added that the line on the Niskin must be marked up to the total depth of the water body being sampled
		4.0.4.1	If the field parameters are measured at the recorded total depth, the data will be qualified with a 'J' qualifier as "improper protocol".
		4.0.5	Added: Clarification language, first paragraph clarifies what we mean "y "representativeness". And clarified language on description "f "non-representative samples".
		4.0.5	Added: Samples collected from "disconnected polls" or are otherwise determined to be not representative of the contiguous body of water being sampled, must be qualified with'a''J' qualifier and carry the comment "Sample collected from a disconnected pool and is not representative of the surrounding water body".
		4.0.6	Clarification–n - added pictures "should" be taken
		4.1	Removed language stating a hole could be cleared if you wait an hour. Now must document NOB
		4.1	Clarified language that describes rinsing bottles with a portion of the water being processed prior to filling the sample bottle.
		4.1.3	Removed this section

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
		4.2	Revision: Contamination – see Section 5.0.2
		4.2.2	Added: Samples and field QC blanks to be submitted for ammonia (**Gray Bottle**) are to be acidified with a **minimum of 5 drops of H2SO4 in the 60 mL bottle instead of the typical 4 drops**. Please note this includes the samples as well as QC blanks because they must have the same amount of acid. Please also note this is the minimum amount of acid required. Additional acid must still be added as necessary if needed to bring the pH below pH 2.
		4.2.4	Added: The volume of sample remaining from sample processing must be discarded in such a way it does not pose the potential to contaminate the area where other samples are to be collected (e.g., discarding sample where replicate samples are to be collected, discarding autosampler sample in an area where the grab sample is to be collected, etc.).
10	7/31/2019	4.3	Shipping language added for congruency with all documents (SOPs)
		Section 5	Changed First sample Trigger (FST) to First Trigger Date (FTD)
		5.4	Added: Samples and field QC blanks to be submitted for ammonia (Gray Bottle) are to be acidified with a minimum of 5 drops of H2SO4 in the 60 mL bottle instead of the typical 4 drops. Please note this includes the samples as well as QC blanks because they must have the same amount of acid. Please also note this is the minimum amount of acid required. Additional acid must still be added as necessary if needed to bring the pH below pH 2.
		5.5	Clarified what is meant by "contamination". Clarified language

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
			specifying that data must be qualified if the sample is not rejected prior to analysis.
		5.9	Changed title to Autosampler procedures since this section contains requirements and is not a "Guide"
		6.3.1	Acceptance Criteria Failure: If verification fails to meet the acceptance criterion at the ***end of a sampling event***, it must be documented in the Trip Comments section of the OCS or handwritten onto the Field Test Report (FTR), along with identifying which parameter failed and all corrective actions planned or taken with the instrument.
		6.10.2	Added: If possible, either the science technician supervisor or a member of the QA Team should be notified while the sonde is still in the water bath. The intent is for the discrepancy to be identified before it is documented. If the assessment determines that the procedure is the problem and not the sonde, then we avoid qualifying the temperature data unnecessarily.
		6.14	Added: Depth profile field measurements (FP) are not duplicated with the field measurements recorded for the grab sample. When collecting FP profiles, the sonde measurements must not be closer than 0.25m and the instrument must not touch the bottom. If the field parameters are measured at the recorded total depth, the data will be qualified with a 'J' qualifier as "improper protocol".
10	7/31/2019	7.1.1	Changes to policies and/or procedures are considered effective upon the final signature (WQM QAO).
		7.3.2	Updated to reflect current COC. Included language for NOBs related to flow sampling

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
		7.3.2	Glossary of codes: added that the "samples relinquished by: space is not signed if there are no samples (all NOB submission)
		7.3.3	Updated to reflect new FTR
		7.3.5.1	Updated to reflect new HFDM requirements. Updated special characters.
		8.1	Added: Procedures for cleaning and/or rinsing equipment prior to collecting blanks must be consistent with procedures used prior to collecting samples (e.g., no extra rinsing, different cleaning procedures).
		8.1	Added: New equipment with different construction / catalog number / manufacturer than currently used equipment, must be assessed for contamination prior to use . An equipment blank must be collected using the piece of equipment and submitted for the analytes that will be collected using the equipment. Contact the QAO or QA Team member for assistance in determining which analytes must be included.
		8.1	Added: For equipment blanks and field cleaned equipment blanks, collected through a Niskin, where the spigot is used to process the sample and an autosampler bucket is used, **a minimum of approximately one liter of water must be passed through the spigot of the Niskin into the bucket.** The remaining may then be released into the bucket by opening the Niskin end cap.

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
10	7/31/2019	8.1.1.1	NEW: EBs must be prepared by pouring AFW greater than the volume of the sample bottles through each piece of sampling equipment and processing the rinsate into the sample collection containers, pouring enough volume of AFW to fill the sample bottles through each piece of sampling equipment and collecting the rinsate into the sample collection container. • The pieces of equipment the AFW passes through or over are the same ones used to collect and/or process the sample. The intent is the AFW is exposed to the same surfaces of the equipment that touch the sample. This includes any drain valves or spigots used to dispense sample that are attached to Niskins or buckets.
		8.1.2.1	NEW: FCEBs must be prepared by pouring AFW greater than the volume of the sample bottles through each piece of sampling equipment and processing the rinsate into the sample collection containers. The pieces of equipment the AFW passes through or over are the same ones used to collect and/or process the sample. The intent is the AFW is exposed to the same surfaces of the equipment that touch the sample. This includes any drain valves or spigots used to dispense sample that are attached to Niskins or buckets.
		8.1.3.1	Added: The FB must be collected by pouring AFW directly into the sample bottle(s), making sure the FB has the same environmental exposure as the corresponding sample. The FB needs to be left open for the same amount of time, but not necessarily at the same time as the sample processing. The time for the FB is different than the corresponding sample time.

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
		8.1.4	Added: If samples are collected more frequently than quarterly (or bi-monthly), then only one set of RSs needs to be collected per quarter (per project). For projects collected less frequently (e.g., every quarter or every two months), the RSs must be collected every other event.
11	9/21/2020	Tables/Figures	Table and figure numbers Updated
		1.4	Added Section 1.4 Annual Review requirements.
		1.5	Added References section.
11	9/21/2020	2.1	Added verbiage to differentiate between "trips" and "events" during sampling.
		Table 1	Added the parameter microcysin.
		Table 2	Defined dipper wand and added dipper pole to equipment descriptions. Defined Nalgene as what material is used for metals.
		Table 3	Reformatted to add applications for instrumentation.
		Table 6	Changed sites to stations.
		Table 7	Added additional information on the proper application for gloves. Removed PVC Vinyl from gloves used.
		3.0	Added all containers brought into field must be labelled for specific use.
		3.1	Added language regarding carboys of AFW for field stations other than FOC. Added language for an additional requirement for Okee Lab to maintain a DI systems Daily Log.
		3.7	Removed requirement to test clean re use samples bottles for cleanliness.
		3.8	Added food/beverages are never to be stored in designated sample cooler.

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
		4.0.3	Added that Nitrile gloves are possible for contaminant for Nitrogen analytes. Vinyl gloves must be used when available when collecting Nitrogen analytes. If vinyl gloves cannot be used, special car must be taken to prevent contamination.
		4.0.4	Moved language from 4.0.4.1 to here regarding when measuring total depth for marshes, the total depth is recorded even if the sample is not collected.
11	9/21/2020	4.0.4.1	Added total depth measurements are recorded in meters. Added when collecting from boat the total depth must be measured prior to sample collection or multi-parameter profile measurements. Added language that from any man-made structure the sample must be taken directly above the water body and if the TD is≥ 0.4 m, a Niskin must be used unless collection of a representative sample is inhibited by vegetation and/or other conditions. If collection with a Niskin is not representative the sample must be taken via intermediate sampling containers. Added language on when and where to take samples if TD is if TD is ≥ 0.10 m and ≤ 0.20m, the sample must be collected directly into a 120 mL sample bottle at half the TD.
		4.1	Language added that the collection date/time for a NOB is determined when the station is not to be visited or collected. Added bullet that preacidified bottles must not be rinsed.
		4.1.2	Language added that if it is not safe to collect from bow of boat that the sample must be collected from forward of mid-ship as far away from the bilge and stem as possible.
		4.2.2	Added to the beginning information regarding preservation of Acid storage in the field.

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
		4.2.3	Added that a back-up technician needs to be assigned to ensure the daily temperature checks are completed in case the primary technician is not available. Temperature readings will be recorded once daily each working day. During office closures temperatures are monitored with a thermometer capable of recording min/max daily. Upon return after office closure the staff must verify min/max range. If within range the letters IC with the persons initials for each day of closure. If not within range the letters OC are placed with the persons initials and QA is immediately notified. Also clarification on replacement of thermometers.
		4.3	Added clarification for the use of multi-lab COC's. Changed to line the cooler with baggies.
		4.9	Added Table 10
11	9/21/2020	5.1	Add language regarding discrete bottle storage.
		5.1.1	Added ACF, ACT, ADT and ATF verbiage.
		5.2	Added language regarding twice year time change.
		5.5	Language added for inspection of intake for autosamplers. Language added for backup grabs.
		5.7	Language added for backup grabs in the event of a program interruption.
		5.8.1	Language on maintaining constant distance for tubing from bottom for autosamplers. Added information regarding batteries.
		5.9.3	Defines ADT and use of autosamplers. Define ACT and use of autosamplers.

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
		6.0	Language about creating a log regarding prior to collecting field parameters with instruction placed in Appendix B.
		Table 13	Language added regarding salinity calculations.
		6.3.2	Information regarding the need to use a different instrument after starting to take samples.
		6.4	Information on date/time for when HFDM is not available.
		6.10.2	Added information regarding Datasonde Maintenance Eform and what the Okee Field station should do when there are issues with calibration verification.
		6.12	Added language regarding Turbidity and qualifiers.
		6.13	Section added "Optical Sensors for Photoreactive Pigment Determinations"
		Table 16	In-situ Aqua Troll and HOBO pendants added.
		7.3.2	For NOB the collection date/time (The month, day, year and time a sample is collected) is determined when that sample will not be collected, or the station will not be visited. Added if no field parameters are collected the OCS must be NOB, never cancelled. The FTR must have a diagonal line through it stating no field parameters collected. Unused Methods were removed from this glossary section
	09/21/2020	7.3.3	Language from 6.0 was also place here.
		7.3.5	Language for Field Notes requirements added. Also added was language for the FTR strike through if no field parameters taken.
		7.3.5.1	Discharge definition, target volume and Comments NOTES removed from section. Depth electronically generated FDC electronically generated added.

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
		8.0	Generic language added about following procedures listed below. Add QC station identification for FOCQC and OKEELAB.
		8.1	Language added on proper procedures to follow when there are issues with QC Blanks.
		8.1.1	Language added for projects that are short duration of seasonal. Also for trips that have two p-numbers associated with them.
		8.1.1.1	Language added on how to select an EB from autosampler.
		8.1.4	Language added for projects that are short duration of seasonal.
		8.1.8.1	ASEB must be submitted at least one month in advance to allow lab time to analyze.
		8.1.8.3	Added section for ASEB Results Evaluation.
		Appendix A	Added Glossary of Terms.
		Appendix B	Added WQMS steps to create a log file on the YSI ProDss.
		Appendix C	Added Okeechobee SI Systems Daily Log.
		Appendix D	Moved from Appendix A to D, PDF converted to Word and updated to reflect current template.
12	12/29/2021	Various	Tables/Figures updated throughout, formatting adjusted. Replaced "Dipper Pole" with "Swing Sampler" throughout.
		1.1.1	Added Resampling subsection language.
12	12/29/2021	1.3	List of Controlled Documents updated.
		2.2	Table 2 Surface Water Quality Sampling Equipment updated. Table 3 updated to include uses for Turbidity Meter. Table 7 updated to reflect current District glove

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
			and equipment practices, Autosampler head and battery added to equipment list.
		3.0	Updated equipment cleaning and decontamination procedures; added language for labelling of transfer containers and acids. Added language for same-day equipment cleaning recommendation. Added language that repaired equipment must be cleaned prior to its next use.
		3.2.1	Added language to specify that HCl must be reagent grade.
		3.3	Major language addition(s) to clarify the processes for decontaminating sample equipment between stations. Added language that rinsing sample equipment with AFW is only optional at the last station.
		4.0.3	Removed vinyl glove language, added nitrile glove rinsing language when collecting NOx.
		4.0.4.1	Surface Water Grab total depth language clarified.
		4.0.6	Added language to clarify/specify that incorrect acidification or the use of an incorrect preservation acid is considered contamination and samples are cancelled, if possible.
		4.1	Added language to clarify where and how grab samples are collected, Added language for determining NOB time/date. Added language for total depth and safety considerations. Added language to specify rinsing of composite bucket spigots.
		4.1.1	Added language to specify that a swing sampler with a 1 L bottle may be used in direct grab sampling. Added language to clarify the process for collecting a grab sample using a dipper wand and 120mL bottle when total depth is > 0.2 m.

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
		4.2.1	Added language to clarify filter rinsing procedures and rinsate definition. Added language to specify annotation of acid lot numbers. Updated language to state that sulfuric and nitric acid dropper bottles must be discarded within one month.
		4.2.2	Added language to clarify location of acid lot numbers and dash numbers, additional language concerning additional acid verification if requested by the supervisor.
12	12/29/2021	4.2.3	Added language to clarify sample storage and storage documentation requirements for samples stored in refrigerator or in coolers prior to shipment or delivery to the laboratory.
		4.2.5	Added language to keep the Van Dom rope out of the bag so it does not come in contact with decontaminated equipment.
		4.3	Added language to clarify that samples must not be left out on the counter for more than 1 hour and Log In notified if extended paperwork completion time is required.
		4.9	Table 9: Added language to footnote 11. Added container (60mL) and added to footnote 4. Removed 'Red' Gross Alpha from table. Added HCL to Red Mercury. Table 10: Added Total Aluminum, Total Copper, and General Solids (28 day holding time) to list of analytes for Metals & Organics in Fish. Added Ash & Ash free Dry Weight, Total Phosphorus, Total Nitrogen, Total Carbon, Total Sulfur, Total Calcium, Total Iron, Total Magnesium, Total Aluminum, Total Copper, Soil pH (7 day holding time), and Moisture Content (28 day holding time) to 'Metals, Nutrients, and Other Analytes in Sediment (SE).' Added Organonitrogen to analytes for Organics in Sediment. Edited footnote 1 to clarify sample preservation code key 4C= cool sample to ≤ 6 °C

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
		5.1.1	Updated First Trigger Date (FTD) and Last Sample Time (LST) definitions.
		5.3	Added language to step 2 to include the spigot must be rinsed and step 4 to specify the use of narrow range pH test strips (0-3 pH units).
		5.8.1	Added language to update the quarterly ASEB tubing replacement process.
		6.0	Added language to clarify the section purpose, portions of body text moved to make the section more succinct.
		6.4	Adjusted syntax to clarify second bullet.
12	12/29/2021	6.5.2	Added language to specify Hydrolab zero calibration documentation requirements.
		6.8.1	Moved portions of stepwise functions for clarity, added language for YSI ProDSS and similar device DO IC sensor requirements.
		6.10.2.2	Added language stating "the high temperature must be performed with a hot water bath of approximately 40 °C."
		6.12	Added language to specify that if the turbidity instrument is not calibrated and/or the calibration is not recorded, the data receive a 'J5' qualifier and comment stating "Instrument not documented as having been calibrated and/or verified."
		6.15.1	Added requirement for all Secchi and Depth lines to be verified annually
		6.16.2	Added specifications for verifying the accuracy of depth sensors on boats so they may be used for total depth measurements during sampling events
		6.18.1	Renamed section to match logbook "Calibration Solution Logbook and Tracking Numbers." Added language to specify practices for Calibration Solution Logbook documentation. Prior terminal logbook entries must be transcribed onto newly generated logbooks.

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
		7.3	Added language to reiterate that information included in corrections/documentation cannot obliterate other information contained within the record.
		7.3.1	Added language to clarify the formatting of Time entries between 12:00:00 – 01:00:00 AM. Moved portions of text for OKEE project(s), added language to specify that EVPA, OLIT, and other marsh projects follow alternative sampling documentation processes.
		7.3.2	Language added to specify how COCs are generated and how collectors must use COCs. Added language stating all persons present during sample collection must be documented on the COC. Clarified NOB/FCEB/EB/RS if/then scenarios and added language for documentation requirements for collecting a NOB/FCEB/EB/RS. Added language to clarify sample cancellation processes. Updated and added language to the Prelogin Summary Report (PSR) Glossary; Added DS (Discharge) specifications and valid codes. Added language to clarify the formatting of the First Trigger Date (FTD) entries and specified formatting for the hours of 12:00:00 – 01:00:00 AM.
		7.3.4	Language added to specify requirements for recording field operations electronically or manually; updated the types of applicable field notes forms.
12	12/29/2021	7.3.5.1	Subsection added to include language for processes related to unused or blank portions of various field notes forms. Updated Figure 7.
		7.3.5.2	Language added to clarify equipment documentation requirements for Surface Water Notebook entries.

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
		7.4	Language added to reiterate that handwritten edits to records must not obliterate other information on the record.
		8.1	Language added to clarify that the collection of Field Quality Control Blanks should mirror the true sample processing as closely as possible for replicability and representativeness. Added language to specify that the equipment used to collect field QC blanks include all of the sampling equipment at the top of the Surface Water Notebook page, unless otherwise noted in the Blank comments on the COC.
		8.1.1.1	Clarified blank collection for trips with Autosamplers and exceptions such as trips with ADT Autosamplers; Added language to specify Marsh blank collection processes.
		8.1.2.1	Language added to clarify Field Cleaned Equipment Blank (FCEB) collection processes and requirements. Added language regarding the 45-degree agitation of Van Dorn. Added language to clarify the process for AFW rinsate.
		8.1.8.2	Language added stating that after an Autosampler Equipment Blank (ASEB) is submitted to the laboratory and email must be sent to notify the laboratory of the blank submission.
		Appendix 1	Added definitions for Assure, Autosampler Discrete Bottle, , Discrete Bottle, Ensure, ISCO Bottle, Rinsate, Sample, Sample Bottle and Swing Sampler.
12	12/29/2021	Appendix 4	Added example of Annual Verification of Boat Electronic Depth Sensors Form.

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
13	10/24/2022	Various	Formatting, updates to links and TOC, removal of archival table location references throughout.
		Table 2	Updated table to include sample processing 'Use" for Horizontal Sampling Bottle: Van Dorn and ISCO Autosampler or equivalent listing. Added tubing connectors and plastic bucket to autosampler equipment.
		Table 3	Added the Keller 36 XiW instrument to list.
		3.1	Added language stating "transport containers are typically 1 L or 250 mL certified-cleaned sample bottles. They must be labelled with the contents and the date they were filled, and must be discarded and not reused.
		3.2.1	Step 4, updated HCl analyte grade requirements for cleaning.
		3.3	Added language stating that "Rinsing the sample tray is required after processing field QC blanks and between the sample and replicate sample collections because, it is possible that the tray has come into contact with preservation acids."
		3.4.1	Step 1, added language stating "If nitrile gloves are used for equipment cleaning, they must be rinsed prior to handling the sampling equipment as per Section 4.0.3."

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
13	10/24/2022	4.0.1	Added language stating "Science Technicians may make necessary adjustments when sampling as dictated by safety or health concerns. Any adjustments must be noted in the field documentation and notification sent to the appropriate Science Technician Supervisor(s), Quality Assurance Officer (QAO), and Field Project Manager (FPM). Data may be qualified depending on the scope and nature of variance."
		4.0.4	Reorganized section to include 'Determining Sample Representativeness'
		4.0.4.1	Added Low-Flow Sampling Work Aid
		4.0.5	Reorganized section to include 'Grab Sample Rejection Criteria'
		4.0.6	Reorganized section to include 'Sampling Depth'
		4.1.1	Added language stating "A dipper wand must not be used from a height that is greater than the length of the dipper wand when fully collapsed. A fully collapsed dipper wand must not exceed the length of 115 cm. If the bottle is inserted into the water at too steep an angle, it will fill with some (or all) water from the surface of the water column. The intent is for all of the sample to be collected from the stated sampling depth (e.g., 0.5 m)."

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
		4.2.3	Added language stating that samples hand-delivered to the District Laboratory must be placed in the sample receiving area or in a designated refrigerator. Added language for after-hours sample receiving and storage requirements.
13	10/24/2022	4.2.5	Added language stating equipment for sample processing must be decontaminated by rinsing three times with AFW immediately after use at each station (including the last station, unless equipment will be cleaned at the base of operation or within 24-hours after the completion of a sampling event).
		4.9	Added a link to Appendix 6, including a detailed list of MDL and PQL requirements for WQM projects.
		5.1	Added language stating "no empty/full contaminated discreet bottle capped or uncapped should be left in the autosampler tub, even as a placeholder."
		5.3	Added language stating acid preservation requirements are located in Section 4.2.2 and that thermal preservation requirements are located in Section 4.2.3. Added language stating that samples must be placed and/or processed on a clean surface included in the field cleaning process, such as sampling. Added language specifying that the use of HFDM pre-defined comment "PC1 | Sample not proportional" must be utilized for collection spans other than 7-days. Added language stating that prior to processing each discrete bottle, the bottle and contents are inspected and accepted or rejected according to Section 5.5.

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
		5.5	Added language stating "the rejection of samples may include stations where a sample is "lost" due to container breakage, spillage, etc. The same steps for documenting the loss are outlined in Section 5.5 and must be followed." Definitions were included for "Not Flow Proportional" and "Not Time Proportional," in terms of rejection criteria.
		5.6	Added section indicating where sample transport and submittal procedures are located.
13	10/24/2022	5.10	Added language stating that for Autosamplers the unused autosampler discrete bottles are rotated towards position 1, except for ADTs, with new lab-cleaned bottles acidified and added at the end position(s).
		6.15	Added language stating that "Un-used p-numbers for the discrete depth profiles must be cancelled, a profile for a STA should be NOB."
		6.17.1	Updated file location for vendor service record archival.
		7.3	Added language stating that WQMQA maintains a signature log for traceability, including the location of the signature log in Appendix 9.
		7.3.2.1	Added Chain of Custody Entries section.
		7.3.2.2	Added Pre-Login Summary Report section.

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
		7.3.2.3	Added Sample Custody section.
		7.3.3	Updated glossary of codes for completing a pre-printed Field Test Report.
		7.3.4	Section reorganized, Figure 8. Example of a pre-printed handwritten Marsh Surface Water Field Sheet updated.
		7.3.5	Added language stating changes to labels must be made without obstructing other information on the label.
13	10/24/2022	8.1	Added language specifying the process for field QC blank sample submittal. Added language stating "For metal samples, since they can be acidified for up to 24 hours before lab sample preparation takes place, they must be acidified in the laboratory and submitted". Added language stating "If an analyte/test is requested for a blank but the corresponding test is not required for the associated samples, the analyte/test requested for the blank must be cancelled.
		8.1.5	Added a note stating, "If any test(s)/ACODE(s)of an RS is cancelled for any reason but the entire RS is not cancelled, the Sample and the other RS must receive a sample comment that states the test(s)/ACODE(s) was cancelled and that test(s)/ACODE(s) must be treated as an FD for validation." Added bullet stating, "A single RS set (i.e., one sample and two RS) may be linked to more than one project if collected during the same sampling trip (by the same sampling crew using the same sampling equipment). If two P-

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			numbers are used for the same trip, only one RS set is collected, not multiple RS sets for the multiple P-numbers."
13	10/24/2022	8.1.6	Added language stating, "If any test(s)/ACODE(s) of an RS are cancelled for any reason but the entire RS is not cancelled, the Sample and the other RS must receive a sample comment that states the test(s)/ACODE(s) was cancelled and that test(s)/ACODE(s) must be treated as an FD for validation."
		8.1.9.2	Updated the file location for ASEB Documentation and Autosampler EB Results and Filter Inventory.
		8.2	Added 'X' identifier to list of Data Qualifier Codes.
		Appendix 1	Updated and included definitions for Aliquot, Depth (Sample), Depth (Total), No Bottle Sample (NOB), Pre-Login Summary Report (PSR), Total Depth.
		Appendix 4	Updated to include the current Verification of Boat Electronic Depth Sensors form, created Sept. 2021.
		Appendix 5	Added, Introductory Guide for Calibration.
		Appendix 6	Added, Analytical Methods and Default QA/QC Targets for WQM.
		Appendix 7	Added, Sample Mix-up or Improper Preservation Investigation form.
		Appendix 8	Added, Temporary Sample Access Request form.
		Appendix 9	Added, WQM Signature Log.

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14	11/20/2023	Various	Updates to formatting, links and signatories.
		1.3	Added the QATI SOP (SFWMD-FIELD-SOP-037), Autosampler SOP (SFWMD-FIELD-SOP-038), and Equipment Testing SOP (SFWMD-FIELD-SOP-039) to list of quality documents and operating procedures.
		1.5	Updated FDEP guidance document references.
		Table 2	Added “Discrete” to Autosampler Equipment Description.
		Table 6	Added YSI ProDSS pH sensor module kits to maintenance kit list.
		Table 7	Added “Weighted Measurement Depth Tape” to list of Other Field Supplies for “measuring water depth when vessels lack electronic depth sensors. (E.g., Airboats operating in deep waters)

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14	11/20/2023	3.1	Added language stating "AFW is water in which all analytes of interest and all interferences are below method detection limits. The source of the water must meet the requirements of the analytical method and must be free from analytes of interest. When changes are made to an AFW system, blanks must be submitted for all analytes submitted to the laboratory. The analytical results from this assessment must all be below method detection limits. Blanks collected for this assessment are collected like an FB, where no equipment is used (e.g., no filter) and the bottle is rinsed prior to filling. Added language stating "even if taken in the field one day and unused, the AFW can be used the next day on a trip."
		3.4.1	Removed stepwise language for autosamplers and included a reference link to the Autosampler SOP (SFWMD-FIELD-SOP-038).
		4.0.3	Updated language for bottle labels from "gray" to "grey," which is what is annotated on laboratory labels.
		4.0.4.1	Removed Low Water Sampling Flow Chart, renamed to "Sampling with Intermediate Devices Flow Chart" and moved to section 8.1.1.2.
		4.0.5	Added language stating "If samples are identified as contaminated or nonrepresentative and are either discarded or qualified, the field project manager must be notified as soon as practicable so they can determine if sample recollection is necessary.

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14	11/20/2023	4.2.1	Added language stating "The tubing associated with the peristaltic pump must be rinsed with an adequate amount of sample water or AFW prior to collection of the respective filtered samples or filtered blanks. Added language stating "Pre-acidified samples are not filtered." Adjusted language to state, "The filter must be rinsed (purged) with a minimum of 30 mL *or 250 ml* of the sample water (samples) or AFW (QC blanks) ***prior to*** filling the sample bottles…"
		4.2.2	Added language stating "If the open acid dropper box is not available at the point where being used, then the acid dropper lot number needs to be applied to the open acid dropper. Modified language to state, "Per supervisor discretion, science technicians in remote sampling units may be asked to verify acidification of bottles that require acidification upon returning to office in accordance with the requirements specified above. If this is done, it must be recorded on the COC. If a mis-acidification is encountered, it must be recorded and reported immediately to the supervisor before being placed in a storage cooler or fridge. When a mis-acidified sample is identified, it must have a qualifier request submitted by the FPM. If any acid is added to any sample bottle after 15 minutes from the time the sample is collected (except for marsh sampling), an improper sample preservation report must be submitted. The comments for the sample must reflect how much acid was added and at what time the acid was added; the data submitted for the analytes from the bottle must be qualified with a 'Y' qualifier."

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14	11/20/2023	4.2.3	Added language stating "If the COC is unavailable to be affixed to the clipboard at login, an email to chemlab@sfwmd.gov needs to be sent copying the FPM and including a detailed explanation of the issue. The WQMS QA Team should also be copied on the email to assist with the issue.
		Table 9	Removed Manganese from analyte list for Light Blue and Green bottle descriptions.
		5.0	Removed language referencing discrete bottles for autosampler processes. Removed table for autosampler collection type, field action, and documentation. Added reference to Autosampler SOP (SFWMD-FIELD-SOP-038). Removed autosampler programming instructions.
		5.1.1 through 5.10.5	Sections removed.
		6.0	Renumbered section header and subsections.
		Table 12	Updated level 2 CCV Annual Verification Temperature acceptance criteria.
		6.10.2.2	Added language stating water baths "within a range of 35 ºC – 45 ºC. Do not exceed the maximum temperature specification for the sensor (e.g., YSI is 50 ºC).

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14	11/20/2023	6.18	Added language stating "Upon opening, the standards must also be initialed and dated, then stored in a designated area."
		6.18.1	Updated language for nomenclature used when labelling Calibration Solution Logbooks to "FOCAmmddyy," where "the date is listed as the date the solution is opened followed by the new tracking number being assigned. If a tracking number already exists for the current date, the tracking number should be copied as is."
		Figure 3	Updated Calibration Solution Logbook example to show new nomenclature for tracking numbers.
		7.3.2.1	Added language stating "the date must be the date of the sampling trip" to applicable scenarios; COCs should not be generated prior to the sampling date. Added language stating unused FTR pages "must be struck through with a single diagonal line and be initialed/dated (month/day/year). Added language stating "If an IC/ICV is recorded for one P# and transcribed to the second P#. It needs to be documented which is the original P# of the IC/ICV OCS comments, the time should match in both."

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14	11/20/2023	7.3.5	Added language stating, "The label must contain the Project Code, Station ID, Sample ID, Sample Type, Sample Preservation, ACODES (tests), Matrix, Time, and Method."
		Figure 8	Updated for pre-printed sample label example generated from LIMS.
		7.4	Added language stating "Information based on direct field observations (e.g., weather, *Secchi observation, or Sample Depth*) cannot be corrected after leaving the sampling station.
		8.1.1	Added link to Sampling With Intermediate Devices Flow Chart in Section 8.1.1.2.
		8.1.1.2	Section added for Sampling With Intermediate Devices Flow Chart.
		8.1.2	Modified language to state "To ensure that the EB includes a full suite of parameters, it should be collected on the sampling day of the project with the longest parameter list."
		8.1.2.1	Removed Autosampler EB language. Added language for dissolved parameters stating, "30 mL or 250 mL, if applicable of water and the rinsate from the filter is discarded prior to collection of the EB."
		Appendix 1	Added or updated definitions for Analyte Free Water, Annual, Deficiency, and Field Sampling Manual (FSM). Annual was defined as "Once every 12 months."
		Appendix 5	Added YSI ProDSS Depth Offset and YSI ProDSS Depth Calibration guidance language.

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
15	12/2024	2.0	Added “Section” and “S” to Water Quality Monitoring Capabilities and WQMS, respectively.
		Table 2.	Removed “2-5” from Autosampler bottle Equipment Description.
		Table 3.	Added Chlorophyl and BGA Measurement to YSI Application section. Added Salinity to HYDROLAB Application section. Added Salinity to In-Situ aqua Troll 600 Application section.
		Table 7.	Added “calibrated” to Weighted Measurement Depth Tape Application section.
		3.0	Added language stating, “and include lot number, expiration date, initial and date the container was filled.” In reference to labelling of all containers. Removed language stating, “brought into the field for the specific use contents (i.e., DI, soapluminox, acid. All small transfer containers (e.g., squirt bottles, small bottles of standards, etc.) brought into the field must be labelled for the specific use (i.e., AFW, soap, acid, etc.)” Added “including transfer containers”
		3.1	Added “If applicable alternate”. Added “(e.g. marsh flights, TP only trips)” in reference to 1L or 250 mL certified-cleaned sample bottles. Updated language stating, “the log is scanned and emailed form the Science Supervisor in Okeechobee, to the QA Team.”
		3.8	Removed “ice chest” and replaced with “cooler”.

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
15	12/2024	4.0.1	Added “station” in reference to sampling location.
		4.0.3	Removed “line” and replaced with “rope”. Added “Gloves are” to maintain listing consistency.
		4.0.6.1	Removed “Operational” from monitoring plan.
		4.1.1	Language for procedure for grab sampling was updated to improve clarity.
		4.2.1	Updated language stating, “disk a peristaltic pump with a membrane filter” to “disk or capsule filter.” Added “and/or peristaltic pump” Added “In-line disk filters used with a syringe” Removed “or 250 ml” from rinse purge values. Replaced “Samples collected” with “Capsule membrane filters” Added “and/or syringe” Updated language on capsule membrane filter use with a peristaltic pump to “be rinsed (purged) with a minimum of 250 mL of the sample water (samples) or AFW (QC blanks) prior to filling the sample bottles, this process must be consistent throughout the day’s trip.”
		4.2.2	Added language stating, “If applicable, all other preservatives must follow the procedures as listed in this section.”
		4.2.3	Added “and at the Okeechobee Field Station” to Thermometer Certificate of Calibration storage location. Moved Mercury in Surface Water (SFWMD-FIELlD-SOP-008) above Pesticide Sampling in Surface Water and Sediment (SFWMD-FIELD-SOP-011). Added “if applicable” to fish shipping bulletin.

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15	12/2024	4.4	Replaced “stainless steel” with “stainless-steel” throughout both paragraphs.
		4.8	Replaced “version” with “revision”.
		Table 12.	Added “once” to Annual verification in Temperature Continuing Calibration Verification (CCV) section.
		6.4	Removed language stating, “If the reading is still not within the acceptance criteria for the procedure, the instrument needs to be inspected and another instrument should be used.” form general guidelines. Added language stating, “If none of the possible reasons above of why the instrument is still not within the acceptance criteria, the instrument needs to be inspected and another instrument should be used.”
		6.10.2.1	Added “Datasonde Routine Maintenance Eform.” for consistency with section below. Removed “instrument maintenance logbook (or other record logbook).”
		6.10.2.2	Added “replaced/temperature/conductivity” in reference to multi use probes. Added language stating “and/or returned from service (internal or external). When pH or DO probes are replaced an ambient temperature verification must be completed before multi-parameter instrument is utilized.” Added “once” to multi-parameter check frequency.
		6.14	Removed language refereeing to calibration completion for extended deployment.

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15	12/2024	6.15	Added language stating, "When field measurements (FP) are collected it is not required to have a bottle count of "zero."
		6.17	Added (i.e., 30 calendar days) Removed "vendor" from surface records. Updated Maintenance Documentation list.
		6.18	Updated date to PDF File naming convention example.
		7.1.4	Updated language for SOP utilization to include reference to Field SOP-001.
		7.1.5	Updated instructions to follow Field SOP-033.
		7.3.2.1	Sonde and Calibration Values Entered, but No Sonde Values Entered in the Field: section updated "The entered calibration values must remain in the OCS; Do NOT NOB the OCS."
		7.3.2.3	Language updated to include current laboratory SOP and CLQM procedures of laboratory staff to ensure sample integrity.
		7.3.4	Updated language to include all instances requiring deviation form protocol. Moved Field Note example to section 7.3.4.2
		7.3.4.2	Added language stating "NOTE: Except for certain BGA site conditions, please reference BGA SOP, (SFWMD-FIELD-SOP-019)". Updated language referring to collection time format.
		7.4	Updated Corrections based on assumptions or recollections are not accepted bulletin.

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15	12/2024	8.0	Added (EB and FCEB only) to sample collection equipment that determines contamination. Moved Ambient environmental conditions underneath sample collection equipment.
		8.0.1	Removed section as rainwater are no longer collected.
		8.1	Removed "they can be acidified up to" in field QC section. Added language stating, "according to the laboratory's acceptance procedure, which includes an improper sample preservation form to be filled out and special procedures to document when the sample was acidified." to field QC section.
		8.1.4	Added "in addition to other QC blank(s)" in FB requirement explanation. Added "at a specific station." Added language "If no other blank was collected on the trip, the" to FB collection bullet. Added "Please see the HFDM SOP (SFWMD-FIELD-SOP-018) for directions on how to add a sample upon the return to the base of operations."
		8.1.4.1	Added "The FB is not filtered" to FB Collection Method bulletin. Added "The FB requires the same acid and thermal preservation as the corresponding sample(s)." to FB Collection Method bulletin. Added "Please see the HFDM SOP (SFWMD-FIELD-SOP-018) for directions on how to add a sample upon the return to the base of operations."
		8.1.9.2	Added "in an excel file titled, "_ASEB_Results_asof_NOV_2020"" to specify Autosampler EB results and Filter Inventory folder location.

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Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
15	12/2024	Appendix 1	Removed “Blind Sample” and its definition from the glossary. Removed “Blind Replicates” and its definition from the glossary. Revised language for Compliance Monitoring Plan (CMP). Removed “ISCO Bottle” from the glossary. Removed “Niskin” from the glossary. Removed “Periphytometer” from the glossary. Removed “Periphyton” from the glossary. Added the term Data Quality Indicator. Updated language to Data Quality Objectives definition. Added Month/Monthly – 30 calendar days. Updated language to Operational Monitoring Plan (OMP) definition. Updated Van Dorn definition to include description of Niskin sampling device.
		Appendix 3	Added checklist for DI System Daily Monitoring Procedures. Added Y/N options to DI System Daily Log.
		Appendix 7	Updated Investigation form to current Lab updated form.
16	09/2025	Various	Changed Science Technician Supervisor to Field Unit Supervisor throughout the FSM
		Various	Changed document or documentation with record or records throughout the FSM
		Various	Replaced Science technicians and sample collectors to collectors throughout the FSM
		Various	Updated various Sections, Figure Numbers, titles and pages

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16	09/2025	1.2	Added member to After the completion of ethics training, each staff member is required to sign the Ethics and Data Integrity Agreement asserting they will maintain the level of ethics required by the WQMS
		Various	Removed archived SOP's Atmospheric Deposition Project (RAIN) (SFWMD-FIELD-SOP-21) and Photosynthetically Active Radiation Data Collection (PAR) (SFWMD-FIELD-SOP-026 along with associated text and /or references throughout the FSM
		Table 1.	Removed Groundwater Column
		2.0	Added sediment to in addition, sample collectors receive specialized training in sediment, pesticides and ultra-trace metal collection methods
		2.1	Removed "Another example would be the FLAB project which is collected over two consecutive days."
		Table 3.	Removed LI COR LI 1500 Datalogger and LI 93 Spherical UW PAR Sensor from instrumentation section and PAR from application section.
		Table 3.	Removed Hydrolab, Trublue 585 CTb, Keller 3b Xiw.
		Table 7.	Added measuring water depth in a water body (stream, canal) to Weighted Measurement Depth Tape application
		Table 7.	Added reference materials, email communication, camera to Field Computer application
		Table 7.	Replaced Delorme with Garmin In Equipment description for Garmin In Reach
		Table 7.	Added Sampe collection and deleted maintenance in AS head application

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16	09/2025	Table 7.	Added power source and deleted maintenance in AS Battery (Lead acid and /or LifePO4 as appropriate) application
		3.1	Added or retired to Disposable carboys must be discarded or retired after ten (10) uses
		3.3	Added nutrients, major ions, physical parameters to All sampling equipment utilized for surface water sampling, processing nutrients, major ins, physical parameters, and reused from station to station
		3.3	Deleted that contact sample from the amount of water used to rinse the equipment must be adequate to ensure all surfaces, including drain valves and/or spigots are flushed with free flowing AFW
		3.3	Added “Before placing the equipment in a clean plastic bag and sealing the bag, the Van Dorn rope must be excluded if not decontaminated."
		3.3	Moved Rinsing sampling equipment with AFW is optional at the last station ONLY if the sampling equipment will be cleaned at the base of operations within 24 hours after the completion of a sampling event, following the procedures described in 3.2.1 General Equipment Cleaning Procedure for Surface Water Sampling. If it is unlikely that the sampling equipment will be cleaned at the base of operations within 24 hours, then the sampling equipment must be rinsed with AFW at the last station and sealed in the plastic bag until it can be cleaned to section 4.2.5

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16	09/2025	3.7	Added 1L discrete bottles to Laboratory personnel wash and dry reuseable sample bottles (e.g., -2L sample bottles, 1L discrete bottles) with a laboratory grade, phosphate -free detergent.
		3.7	Removed test from Laboratory personnel duties regarding reusable sample bottles.
		4.0.4/ 4.0.5	Replaced practicable with possible in the last bullet for Grab Sample Rejection Criteria
		4.0.5	Updated language to second bullet in Grab Sample Rejection Criteria to include These observations must be noted in the Notes section of the COC for the affected sample.
		4.0.6	Removed "(e.g., with a Van Dorn in a horizontal position, and every 0.5 meter" from fourth bullet explaining equipment used for grab samples.
		4.1	Added "Total samples (i.e., unfiltered samples for TN, TP, etc.) are processed before the dissolved (filtered) samples. The intent is that the total sample concentration can indicate the overall extent of contamination, while the dissolved samples reveal the proportion of contaminants that are actually available to organisms."
		4.1	Replaced "120" with "60mL" and changed TD range from TD ≥ 0.10 m and < 0.20 m to TD ≥ 0.10 m and ≤ 0.20
		4.1.1	Updated language to Direct Grab Sampling adding holding a sample bottle in a gloved hand
		4.1.1	Removed (e.g., 120Ml bottle) from dipper wand collection of samples when Total Depth is > 0.2 m

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Version	Date Issued (Month /Year)	Section	Description of Edits/Changes
16	09/2025	4.1.1	Added i.e. 115 cm or 45 inches to fourth bullet A dipper wand must not be used from a height that is greater than the length of a dipper wand when fully collapsed.
		4.1.1	Removed "A fully collapsed dipper wand must not exceed the length of 115 cm" from fourth bullet
		4.1.1	Updated language to include "instead of water from a sampling depth"
		4.1.2	Updated language "when a boat is used to access a station" and 'taken from the bow of the boat"
		4.2	Added bullet "Total samples (i.e., unfiltered samples for TN, TP, etc.) are processed before the dissolved (filtered) samples. The intent is that the total sample (i.e., unfiltered samples for TN, TP, etc.) concentration can indicate the overall extent of contamination, while the dissolved samples reveal the proportion of contaminants that are actually available to organisms."
		4.2.1	Added During filtration of the sample or blank, the filter must be removed from the syringe before pulling out the plunger from the syringe.
		4.2.1	Replaced language "This is to prevent water from blowing out the pre-filter in inlet side of the filter" with "This prevents filter damage/failure that could compromise samples."
		4.2.1	Replaced "day's trip" with "sampling event" in procedure for using In-line disc filter
		4.2.1	Added language "due to the possibility of sample contamination" to the end of bullet six Sample Filtration

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16	09/2025	4.2.1	Added “due to the possibility of the acid damaging the filter and contaminating the sample” to pre-acidified samples are not filtered
		4.2.2	Deleted and recommended from Alternative storage in designated containers in field sampling kits for each technician, which are then stored at room temperature overnight, are acceptable
		4.2.2	Replaced “indicated” with “listed” in the sampling processing procedure for the acid preserved samples
		4.2.2	Added language “The number of added drops must be recorded in the field notes” to section B
		4.2.2	Replaced “indicated” with “listed’ in the sample processing procedure for the acid preserved samples listed below must be performed in the order listed
		4.2.2	Added The number of added drops must be recorded in the field notes to Care must be taken not to over-acidify the sample
		4.2.2	Deleted language referencing science technicians in remote sampling unit
		4.2.3	Updated language to include clarity by removing “they are”
		4.2.3	Added regular laboratory operating to When samples arrive after regular laboratory operating hours, they mut be stored overnight in the laboratory designated refrigerator, and the associated COC must be affixed to the clipboard at Login.
		4.2.3	Removed language “of why the COC was not present upon sample submission of the issue” from sixth bullet

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16	09/2025	4.2.3	Removed “to assist with inform them of the issue” from the sixth bullet of Thermal Preservation
		4.2.5	Changed the Section Title from Decontamination of Sampling Equipment between Station to Decontamination of Sampling Equipment at the Last station
		4.2.5	Added utilized and surface water to All equipment utilized for surface water sampling, processing nutrients, major ions
		4.3	Removed language “place samples in the refrigerator and notify Log in”
		4.3	Removed Log in will then not have to seek out and notify the collectors that the samples must be refrigerated as the deadline approaches from If an extended time to complete the paperwork is expected, place samples in the refrigerator and notify Log in
		4.3	Added “adhesive product” to Use shipping tape (or a similar adhesive product) to secularly tape cooler shut
		4.3	Replace accessed with seen in Place a shipping label on the cooler in a location where it is easily seen (i.e., the lid or side, not the bottom of the cooler)
		Table 9	Removed Total Kjeldahl Nitrogen (TKN) from the Magenta (MA) analytes and Dissolved TKN (TKND) from Light Blue (LB) analytes
		Table 9	Added All emergency samples are collected using the largest bottle size to footnotes number 1
		6.0	Added dissolved oxygen percent saturation to list of field parameters.

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16	09/2025	6.0	Updated language in first paragraph removing the use of the word technician.
		6.1	Science Technicians replaced with “Collectors”
		6.3.2	All instances of the word document were replaced with records.
		6.5.1	Removed language “In the laboratory, standards of appropriate conductivities conductance values must be prepared per SM2510”
		6.5.2	Removed first bullet point regarding zero point calibration for Hydrolab.
		6.5.2	Language updated sample conductivities replaced with “conductance values”.
		6.8	Removed Clark Cell
		6.8.1	Removed language providing instruction for correct DO calibration protocol for Hydrolab devices.
		6.8.1	Updated language of water calibration temperature to improve clarity.
		6.8.1	Removed language regarding Clark Cell DO calibration procedure.
		6.10.2	Title change to Temperature Verifications
		6.10.2	Updated language at the beginning of the paragraph regarding temperature probe verification.
		6.10.2.1	Section title changed from Quarterly Calibration Check to Quarterly Temperature Verification
		6.10.2.1	Updated Datasonde Routine Maintenance eForm to Sonde Maintenance Form.
		6.10.2.1	Replaced calibration with temperature in the second paragraph. Same change made in section 6.10.2.2

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16	09/2025	6.10.2.2	Added language “prior to being sent for service at an authorized repair facility”.
		6.11	Removed section 6.11 Photosynthetically Active Radiation (PAR).
		6.12	Removed do not calibrate sonde, new YSIEXO can be calibrated and verified.
		6.15	Language added to improve clarity of correct side of Secchi disk.
		6.15	Added language for the correct procedure for measurement of Secchi disk.
		6.16.1	Renamed section title from Maintenance Documentation to Maintenance Records.
		Table 14	Removed TruBlue 285 CT Data Logger and Tru Blue 585 CTD Data Logger & Li-Cor from Instrument List.
		Table 14	Deleted two rows CHL and BGA and updated Footnote
		6.18	Renamed section title from Standards Documentation and Storage to Standards Records and Storage.
		7.1.1	Changed Appendix K to Section 4.3.9
		7.1.1	Updated language for the definition of controlled documents.
		7.3-7.5	Sections removed from FSM and 040 Field Records SOP was developed.
		Figure 4,5,6,7,8	Figures removed from FSM and added to Field Records SOP 040
		8.1	Added submitted for any analyte other than to When a field QC blank that is submitted for any analyte other than metals is improperly preserved, and would then be qualified based on that improper preservation
		8.1	Added /tests when referring to ACODES to include other measurable

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16	09/2025	8.1.2	Added link to Field Records SOP-040
		8.1.2	Removed “If some sampling equipment is used only once on a trip where some other sampling equipment is used multiple times, an EB will not be performed. All equipment will be cleaned in the field and included in the FCEB” from EB bulletin.
		8.1.2.1	Removed “This also includes the 45-degree agitation of the Van Dorn” from EB Collection Method.
		8.1.3.1	Replaced equipment with bucket and swing sampler 1L bottle.
		8.1.3.1	Removed “This also includes the 45-degree agitation of the Van Dorn” from FCEB Collection Method.
		8.1.3.1	Added language for specifying the 250mL volume of rinsate used to purge peristaltic pump or syringe prior to FCEB collection.
		8.1.5	Replaced all instances where analyte was mentioned with parameter.
		8.1.7.1	Updated Split Sample language
		8.1.9	Replaced Tygon® with “intake tubing” to include other brands of tubing used in AS.
		8.1.9.1	Added language to ASEB collection method “After an ASEB is collected, the tubing must be stored in a sealed bag to minimize potential contamination, as any other piece of sampling equipment. To use the tubing in the field it must be dried (i.e. compressed air), otherwise it must be discarded. If tubing EB results show contamination another ASEB must be collected.’

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Version	Date Issued (Month/Year)	Section	Description of Edits/Changes
16	09/2025	8.1.9.2	Changed section title from ASEB Documentation to “ASEB Records”
		Glossary	Removed ACF and its definition from the glossary.
		Glossary	Removed ACT and its definition from the glossary.
		Glossary	Removed ADT and its definition from the glossary.
		Glossary	Removed ATF and its definition from the glossary.
		Glossary	Removed Composite Station and its definition from the glossary section.
		Glossary	Updated Dipper Wand definition to include fishing bobber as part of the description of floating device.
		Glossary	Defined Document and added examples of documents to the glossary section.
		Glossary	Horizon Field Data Manager (HFDM) changed to Field Data Manger in the glossary section.
		Glossary	Updated language in NOB definition to improve clarity.
		Glossary	Defined Records and added examples of records to the glossary section.
		Glossary	Removed Sample Collector and its definition from the glossary section.
		Glossary	Added “a.k.a collector” to Science Technician definition to signify the two terms equivalence.
		Glossary	Changed Science Technician Supervisor to Field Unit Supervisor in the glossary section.
		Glossary	‘Site” was removed from the definition of the Station and Site to directly reference the Water Quality Monitoring Station Registration SOP.
		Glossary	Removed the definitions for Take All and Take Remaining from the glossary section.
		Glossary	Updated language for Total Depth definition removing reference to groundwater measurement

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16	09/2025	Appendix 10	Added Appendix 10; Table FT 15000-1: Solubility of Oxygen in Water at Atmospheric Pressure
		Appendix 11	Changed Summary of Changes to Appendix 11

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