SFWMD-FIELD-FSM-001-11

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
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
STS	Science Technician Supervisor

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
WQM	Water Quality Monitoring Section

Section 1: Introduction

1.0 Quality Commitment

The South Florida Water Management District's (SFWMD) Water Quality Monitoring Section (WQM) 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 data collected by the WQM. The FSM version 10 should be recognized as the first manual 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 addressed by this FSM, the QM and WQM Standard Operating Procedures (SOPs) include: FA1000, FC 1000, FD1000, FQ1000, FS1000, FS2000, FS2100, FS2200, FS4000, FS6000, FS7000, FS8200, FT1000, FT1100, FT1200, FT1300, FT1400, FT1500, FT1600, FT1700 and FT1900.

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 WQM 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 WQM. Where "FSQM" is referenced in WQM contracts, this FSM is the document to be used by the contractor for sample collection procedures.

1.1 Exceptions and Variance From QA/QC Requirements

It is the responsibility of individual WQM Science Technicians and Science Technician 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 Science Technician may make necessary adjustments as dictated by safety or health concerns. Variances must be noted in the field documentation and notification sent to the appropriate Science Technician Supervisor(s), WQM 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.

1.2 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 WQM 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 is required to sign the Ethics and Data Integrity Agreement asserting they will maintain the level of ethics required by the WQM. WQM 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.).

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 Science Technician Supervisor, Field Project Manager (FPM) and/or a member of the WQM Quality Assurance (QA) team with the exception of health and/or safety

concerns without documenting 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 WQM 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)
- WQM 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)
- Atmospheric Deposition Project (RAIN) (SFWMD-FIELD-SOP-21)
- Archived Records Storage and Retention SOP (SFWMD-FIELD-SOP-022)
- Line Intercept Macrophyte Survey (SFWMD-FIELD-SOP-024)
- Photosynthetically Active Radiation Data Collection (SFWMD-FIELD-SOP-026)
- 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)
- Correction of Field Records (SFWMD-FIELD-SOP-032)
- Field Project Management (SFWMD-FIELD-SOP-033)

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 documented even if no changes are necessary. Any revisions to this FSM will be tracked in WQM's document control system and in Appendix D of this FSM. The WQM 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. Standard Operating Procedures for Field Activities, DEP-SOP001/01. Bureau of Assessment and Restoration Support, Standards and Assessment 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.

Section 2: Sampling Capabilities

2.0 Water Quality Monitoring Capabilities

Water Quality Monitoring (WQM) 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, Science Technicians receive specialized training in groundwater, pesticides and ultra-trace metal collection methods. WQM 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

WQM 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. Another example would be the FLAB project which is collected over two consecutive days.

Table 1. Sampling Capabilities by Major Category (2.1.A)

Parameter	Surface Water	Ground water	Soil/ Sediment	Rain	Biological Tissues
Cations	X	X	X	X	X
Inorganic anions	X	X	X	X	X
Nutrients	X	X	X	X	X
Metals	X	X	X	X	X
Physical Properties	X	X		X	X
Organics	X	X			
Organic Compounds			X		X
Extractable Organic Compounds	X	X			
Microbiological	X	X			
Chlorophyll	X				
Microcystin	X				
Radionuclides	X	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 (2.2.A)

Category	Equipment Description	Type of Material	Use	Notes
Grab sampling	Horizontal sampling bottle: Niskin, VanDorn or equivalent	PVC, polycarbonate, acrylic	Collection	1
	Dipper Wand – (golf ball retriever)	Various	Collection	2
	Dipper Pole – (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	N/A	Collection	1, 2
	Pump tubing	Silicone	Collection	1
	Sample bottles	Plastic, HDPE, or Nalgene (metals)	Collection, sample transport and storage	
Auto-sampler	ISCO autosampler or equivalent	N/A	Collection	2
	Sample bottle, 2-5 gal.	Polypropylene	Collection	
	Sample bottles, 1 L	Polypropylene	Collection	
	Pump-head tubing/intake tubing/distributor-arm tubing	Silicone/Tygon	Collection	
	Tubing Intake Strainer	Teflon/Stainless Steel	Collection	

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

Table 3. In-Situ Field Measurement Instrumentation (2.2.B)

Instrumentation	Application
YSI (6-Series), PRO-DSS	• Temperature measurement • Specific conductance measurement • pH measurement • Dissolved oxygen measurement • Salinity measurement
HYDROLAB (DataSonde 4, MiniSonde and 5- Series)	• Temperature measurement • Specific conductance measurement • pH measurement • Dissolved oxygen measurement
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
TruBlue 585 CTD	• Temperature measurement • Specific conductance measurement • Stage measurement
Turbidity Meter	Turbidity measurement for GW stabilization
Secchi Disk	Water Clarity
LI-COR LI-1500 Datalogger and LI-93 Spherical UW PAR Sensor	PAR
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

Table 4. Sample Bottles (2.2.C)

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 (2.2.D)

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 (2.2.E)

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 buffers7, 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)

Table 7. Other Field Supplies (2.2.F)

Equipment Description	Application
Coolers large enough to contain all samples and wet ice	Sample preservation and transport
Polyethylene bucket, 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	Not used for collection of Nitrogen species (e.g. TN, NOx, NO2, TKN). Sample contamination prevention and protection of collector from sample preservative, ambient environmental conditions, etc.
Gloves, disposable, latex, powder free	Sample contamination prevention and protection of collector from sample preservative, ambient environmental conditions, etc.
Gloves, disposable, vinyl, powder free	Not used for Organics (e.g. pesticides). 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
Self-adhesive bottle labels	Labeling
Waterproof, indelible pens	Field documentation, 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 Niskin or Secchi lines
Niskin vehicle clip / Niskin Rack	Provides sturdy Niskin 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
Field computer	Electronic documentation
Field note sheets	Field notes
Graduated Cylinder	Autosampler calibration check
Project location maps	Station location
DeLorme InReach	Communication
Digital camera	Station documentation
Global Positioning Systems (GPS)	Station location

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 brought into the field must be labelled for the specific use (i.e., AFW, DI, soap, acid, etc.). 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 offsite equipment cleaning documentation (Section 3.2.2), and the Phosphate-Free soap and HCl (Section 3.2.3) log pages and/or other appropriate documentation must be submitted to the laboratory along with the samples and the usual documentation 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.

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)

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

Analyte-Free Water must be obtained from a laboratory that has a QA/QC approved water purification system. 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. 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.

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 and follow the same procedures for cleaning and documentation specified below.

A "Container Cleaning" logbook must be maintained by the laboratory or by the personnel who performed the cleaning and must document 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 five (5) times. Disposable carboys must be discarded after five (5) uses. Gloves must be worn when cleaning carboys.

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 WQM and WQM contractor operations.

In addition to maintaining a "Container Cleaning" logbook, Okeechobee WQM staff are required to maintain a "DI System Daily Log" (see Appendix C) 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 to the STS in Okeechobee, and to the QAO.

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.
2. All surfaces must be washed thoroughly 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 Niskins 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 10% w/w (25 % v/v) hydrochloric acid (one volume concentrated hydrochloric acid and three volumes AFW).
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.

3.2.2 Equipment Cleaning Logbook for Surface Water Equipment

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

- The cleaned equipment's unique ID number (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 documented or cited on each page of the Equipment Cleaning logbook.

For offsite cleaning on overnight trips, the cleaning of the equipment must be documented 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 documented 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 and
- 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 and processing and reused from station to station must be decontaminated by rinsing three (3) times with AFW immediately after use at each station (including the last 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 that contact sample are flushed with free flowing AFW.

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 following procedure:

1. Gloves must be worn while handling the equipment.
2. All surfaces must be washed thoroughly with hot sudsy tap water with a phosphate-free laboratory detergent such as Liquinox. A brush should be used to remove particulate matter or surface film.
3. After washing, all surfaces must be thoroughly rinsed three (3) times with tap water.
4. All equipment surfaces must be rinsed three (3) times with AFW using enough water to assure that all equipment surfaces are thoroughly clean.
5. The equipment must be air dried in a clean, designated equipment drying area.
6. Place dry strainers in a clean plastic bag and seal prior to transporting to the sampling site.

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 SOP* (SFWMD-FIELD-SOP-011).

3.7 Sample Bottles (Reusable and Disposable)

Laboratory personnel wash, dry and test reusable sample bottles (e.g. autosampler discrete bottles and 2L sample 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 analyzing laboratory.

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 tap water. If an ice chest 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.

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 locations unless a valid justification (e.g. vegetation impact, construction, safety, etc.) for sampling at another location is noted in the field notes and on the Chain of Custody (COC).

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 sites should be collected prior to STA inflow sites) unless project requirements dictate otherwise as described in the Project's Monitoring Plan.
- Samples must be 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 sample 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.

If vinyl gloves are being used during a sampling trip, then only the Van Dorn **line** 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 approved by the QAO prior to use),
    - **Nitrile gloves are a possible contaminant for Nitrogen analytes (e.g. TN, NOx, NO2, TKN).** Vinyl gloves must be used when available when collecting Nitrogen analytes.
    - If vinyl gloves are not available and Nitrile gloves must be used, special care must be taken to prevent contamination of the sample if Nitrogen analytes are collected.
    - Nitrile gloves must not be used to cover the AFW carboy spigots.
- Not come into contact with the collected sample, or the interior of sampling equipment, sample composite container, or the sample bottle,
- Be changed
    - After collecting and/or processing all the samples for a single sampling station,
    - If torn or used to handle extremely dirty or highly contaminated equipment.
    - Prior to collecting field QC blanks

4.0.4 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.

4.0.4.1 Surface Water Grab Total Depth and Sampling Depth

- Depth measurements for surface water collection are recorded in meters. 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).
- Total Depth (TD) is the depth to the bottom of the water body or column being sampled.
- 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 (e.g. with a Van Dorn (Niskin) in a horizontal position, the rope must be marked every 0.5 meters 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 operational monitoring plan. Field parameters must not be collected if the measured TD is ≤ 0.25m.

4.0.5 Determining Representativeness of Sampling Conditions

Representativeness, an extremely important data quality indicator, addresses the extent to which measurements actually reflect the water body from which they were taken, as well as the degree to which samples actually represent the water body. Therefore, one component of representativeness is addressed by properly specifying the number and location of samples within the study design. Like many types of quality criteria, representativeness can be properly interpreted only in the context of the intended use of the collected data.

Samples must only be collected if they are representative. Samples are considered representative if they are contiguous with the main water body or part of the bulk water flow being sampled. 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).

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 site) amount of suspended sediments (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. WQM 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 collected from "disconnected pools" or are otherwise determined to be not representative of the contiguous body of water being sampled, must be qualified with a 'J' qualifier in the database and carry the comment “Sample collected from a disconnected pool and is not representative of the surrounding water body”.

4.0.6 Grab Sample Rejection Criteria

Sample collectors are responsible for visually inspecting and accepting/rejecting a 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 WQM QA Team, Science Technician Supervisor (STS) and/or FPM, any decision must be made prior to relinquishing the sample to the laboratory if possible.

- Documentation must be complete and clearly explain the reason for rejecting the sample.
- Documentation of observed conditions that directly affect the quality of a sample and/or field data must be noted in the Notes section of the COC for the affected sample.
- Digital images should be taken and sent to the FPM if the images assist in documenting the conditions and noted 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 WQM 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.

Table 8. Grab Sample Rejection Criteria (4.0.A)

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 document 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 document the observed condition in the field notes.

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.
- 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 upstream by the sample collector.
- If no upstream location is available, the station should be considered a "no bottle sample" (NOB) station, the reason documented, and the STS 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 determined when that 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, the sample collection authorization and activities must be documented 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 Niskin 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 Niskin, then a sample via an intermediate sampling container (dipper pole with 1L bottle) must be used if it is possible to get a more representative sample. When sampling from the bank or side of a body of water OR the TD is ≥ 0.4 m, then a sample via an intermediate sampling container (dipper pole 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 only. A 120 ml bottle is to be used in a total depth range of ≥ 0.1m and ≤ 0.4m.
- If TD is ≥ 0.10 m and ≤ 0.20 m, then the sample must be collected directly into a 120mL sample bottle at half the TD.
- Clear comments MUST be made recording the type of equipment used, site conditions and representative nature of the sample collected.

The following sampling procedures must be employed when relevant:

- Sample *collection* equipment (e.g. Niskin, 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) 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.
- Preacidified 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 inserting the sample bottle into the water column and filling it with water, without the use of any intermediate equipment such as a Van Dorn sampler or a pump. 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.
- 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.
- The bottle opening is turned 90 degrees towards the direction of water flow (if applicable). Water should be allowed to slowly flow into the bottle. The bottle is inverted (turned upright) and removed from the water column and the sample bottle capped.
- If a dipper wand is used for the collection of samples directly into a sample bottle (e.g.120 mL bottle):
    - 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.
- The filled bottle should be quickly removed from the water column and the sample bottle capped.
- Dipper wands must not be used from a height above the water that would permit the bottle to be inserted at an angle that the neck cannot be inserted perpendicular to the water surface. If the bottle is at 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 come from the stated sampling depth (e.g. 0.5m).

4.1.2 Grab Sampling from a Boat

When a boat is used, the sample must be taken from the bow (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 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 sample 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.

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 a syringe using an attached in-line disk membrane filter.

- The filter must be rinsed with a minimum of 30 mL of the sample water (samples) or AFW (QC blanks) and the rinsate discarded ***prior to*** filling the sample bottles.
- Samples collected using a peristaltic pump must be filtered through a 0.45 µm high volume capsule filter that has been pre-rinsed with a minimum of 250 mL of the sample water or AFW prior to collection of the respective filtered samples and/or filtered blanks.

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.

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

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, atmospheric deposition and samples from remote stations accessed by helicopter.

- The type, lot number and amount of acid added per volume of sample bottle and the result of the pH value within range must be indicated in the field notes.
- 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.
- H_2SO_4 and HNO_3 acid dropper bottles must be discarded within one week (7 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 indicated***:

1. All non-acidified 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.
3. Samples and field QC blanks to be submitted for ammonia (Gray 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 4.
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 documentation. 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.
- 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 documented 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 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.
    - Samples stored in a refrigerator prior to shipping must be maintained at a temperature > 0°C and ≤ 6°C. Water samples must not be allowed to freeze.
    - The temperature for any refrigerator must be measured using a NIST traceable thermometer and documented 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:
            - 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 WQM QA Team.

- 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 documented 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.

- 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.

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.).

4.2.5 Decontamination of Sampling Equipment Between Stations

All equipment used for sampling and processing nutrients, major ions and physical parameters and reused from station to station must be decontaminated by rinsing three (3) times with AFW immediately after use at each station, (including the last station), before placing the equipment in a clean plastic bag and sealing the bag.

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

- Print the multi-lab COCs from LIMS using the "pub" account (see the *HFDM* SOP, SFWMD-FIELD-SOP-018 Appendix 1, Section J).
- 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)
- *Pesticide Sampling in Surface Water and Sediment* (SFWMD-FIELD-SOP-011)
- *Mercury Sampling Surface Water* (SFWMD-FIElD-SOP-008)

- 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.
  - Use shipping tape or similar 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 accessed (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. Science Technicians 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-017)) to identify and review the desired methodology.

4.5 Groundwater Sample Collection

Groundwater samples collected for WQM 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 WQM 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)
- *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 WQM can be found in the current revision of the *Mercury Sampling 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.

Table 9. Hold Time and Preservation for Surface Water[1] (4.0.B)

Bottle Label Color[18]	Analyte	Preservative	Preservation Code[8]	Container Size (mL); Material	Holding Time
Beige (BE)	Lab pH (LPH)	> 0 ºC & ≤ 6 °C	4C	120 - 1 analyte 250 - 2 or 3 analytes 500 - > 3 analytes Plastic	Immediate
	Lab 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 ºC &≤ 6 °C	4C	1000; Plastic	7 Days
	Volatile Suspended Solids (VSS)				
	Low level TSS			2000; Plastic	
Orange (OR)[12]	Color (COLOR)	Field Filter > 0 ºC & ≤ 6 °C	4C, F	120; 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 ºC & ≤ 6 °C	4C, D	1000; Opaque (dark) Plastic[11]	48 Hours to Filter, 28 Days[5] to extract and analyze
	Chlorophylls (CHL-N)				
	Pheophytin (PHEO)				
Magenta (MA)	Total Kjeldahl Nitrogen (TKN)	> 0ºC & ≤ 6°C Sulfuric Acid to 1.3 < pH < 2	4C, SA	60 - 1 analyte[10] 120 - 1 or 2 analytes	28 Days
	Total Nitrogen (TN)				
	Total Phosphorus (TPO4)				

Bottle Label Color[18]	Analyte		Preservative	Preservation Code[8]	Container Size (mL); Material	Holding Time
	Total Organic Carbon (TOC)				250 - >3 analytes Plastic	
Light Blue (LB)[12]	Dissolved Phosphorus (TDPO4)		Field Filter Sulfuric Acid to 1.3 < pH < 2 > 0 ºC & ≤ 6 °C	4C, SA, F	60 - 1 analyte[10] 120 - 1 or 2 analytes 250 - >3 analytes Plastic	28 Days
	Dissolved TKN (TDKN)					
	Total Dissolved Nitrogen (TDN)					
	Dissolved Organic Carbon (DOC)					
Gray (GY)[12]	Nitrate-Nitrite (NOX)		Field Filter Sulfuric Acid 1.3 < pH < 2 > 0 ºC & ≤ 6 °C	4C, SA, F	60; Plastic	28 Days
	Ammonia (NH4)					
Bright Blue (Total Metals) (BB)	Aluminum (TOTAL)	Manganese[17] (TOTMN)	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 Metals) (GR)[12]	Aluminum (TDSAL)	Manganese[17] (TDSMN)	Field Filter[7] Nitric Acid to 1.3 < pH < 2	NA, F	250; Nalgene Plastic[6]	6 Months
	Arsenic[17] (TDSAS)	Nickel[17] (TDSNI)				
	Barium[17] (TDSBA)	Lead[17] (TDSPB)				
	Beryllium[17] (TDSBE)	Selenium[17] (TDSSE)				

Bottle Label Color[18]	Analyte		Preservative	Preservation Code[8]	Container Size (mL); Material	Holding Time
	Cadmium[17] (TDSCD)	Zinc (TDSZN)				
	Chromium (TDSCR)	Iron (TDSFE)				
	Copper (TDSCU)	Silver[17] (TDSAG)				
	Calcium (CA)	Strontium (TDSSR)	Field Filter[7] Nitric Acid to 1.3 < pH < 2	NA, F	60; Plastic	6 Months
	Magnesium (MG)	Sodium (NA)				
	Potassium (K)					
Brown (BR)	Microcystins		> 0 ºC & ≤ 6 °C	4C	124; Glass	7 Days
Red	Gross Alpha		Nitric Acid to 1.3 < pH < 2	NA	1000; Plastic	6 Months
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
	Organochlorine Pesticides[19]					
	Organophosphorus and Organonitrogen Pesticides[19]				1 L; Brown glass	
	Total Organic Carbon (TOC)[19]				125 mL; Plastic	
Red (Mercury)	Total Mercury[19]		Cool, ≤ 6 °C	4C	125 mL; Plastic	28 days, 90 days for analysis
	MeHg[19]		Nitric Acid to 1.3 < pH < 2 Ship at 0-4 °C and dark immediately	NA	250 mL; Plastic, pre-preserved	48 hours, 6 months for analysis

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.
2. Cooling to 4ºC is not necessary for chlorides.
3. According to the District method.
4. A 120 mL plastic bottle must be used if collecting ortho-phosphate and/or nitrite sample.
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 60ml 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 Niskin provided the sample is then expeditiously transferred into an opaque bottle.
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.

Table 10. Holding and Preservation Times for Other Matrices

Matrix	Analyte	Preservation	Preservation Code[1]	Container Size (mL); Material	Holding Time
Metals and Organics in Fish (BFI)[3]	Total Mercury[2,4]	≤ 6 °C in the field; Store at < -20 °C	4C	10; Plastic	6 Months
	Other Metals[2,4]			250; Glass	
	Organics[2,4]				
Metals and Organics in Sediment (SE)[3]	Total Mercury[2,4]	0-4 °C during shipment; ≤ 4 °C in lab	4C	250; glass jar	1 year
	MeHg[2,4]				
	Other Metals[2,4]	≤ 6 °C in the field			6 months
	Total Organic Carbon[2,4]				
	Moisture Content[2,4]				
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 Nitrogen Pesticides[2,4]				
	Urea Herbicides and Imidacloprid[2,4]				

1. Sample preservation codes on labels: **4C** = cool sample to 4°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.

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 they are triggered (flow or time).

5.1 Deployment and Operation

Autosamplers, deployed at designated stations, are typically housed within prefabricated enclosures 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.
    - Laboratory-cleaned discrete bottles arranged within the tub at numbered positions are secured with a plastic retaining ring and three draw cords.
    - Each discrete bottle is pre-preserved with 20 or more drops of H_2SO_4, this amount should preserve a full discrete bottle at a pH between 1.3 and 2.0 units.
    - It is permissible to place a new pre-preserved discrete bottle with 10 drops of H_2SO_4 in position number one (1) in the tub. If this is done, the remaining discrete bottles in the autosampler tub must be rotated toward position number two (2).
- 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.
- 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 removed from the vehicle and returned to the laboratory for cleaning regardless of the laboratory cleaning date.

5.1.1 Definitions

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

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

First Trigger Date (FTD) – The date and time the first sample aliquot was requested.

Last Sample Time (LST) – The date and time the last sample aliquot was requested.

ACF: Autosampler Composite Flow Proportional (See Glossary)

ACT: Autosampler Composite Time Proportional (See Glossary)

ADT: Autosampler Discrete Time Proportional (See Glossary)

ATF: Autosampler Composite Time Flow (See Glossary)

5.2 First Trigger (FTD) Date / Time

- The First Sample Trigger is the date and time the first sample aliquot was triggered and collected by an autosampler. This date and time are used to determine the holding time for the analysis of the autosampler sample. The FTD date and time must be retrieved from the autosampler at sample collection and documented on the Chain of Custody (COC) for each autosampler sample submitted to the laboratory. The FTD is not required if the collected autosampler sample is discarded, lost or not collected for any reason. If the FTD is recorded and the sample is NOB for any reason, it does not have to be corrected.
- If the FTD cannot be determined, the autosampler collection date and time from the preceding weeks COC must be used as the FTD. A comment must be made on the COC and in the field notes explaining the reason this occurred.
- If the autosampler is displaying a Program Complete error message, the LST must also be recorded; see the Autosampler Reference Guide (Section 5.9).
- The internal clock of all autosamplers will need to be manually adjusted twice a year for the time change of Daylight Savings Time. This adjustment must occur on the first sampling trip after the time change.

5.3 Sample Retrieval and Processing

- Samples must be protected from environmental contamination at all times. During sample retrieval, the autosampler head (top of the sampler with the controller) must not be placed on a surface that is obviously contaminated (e.g. platform covered with bird feces) unless steps are taken to protect the autosampler controller from contamination (e.g. placing it on a plastic bag).
- Samples must be processed into sample bottles on a surface that is included in the field cleaning process (e.g. tray, plastic sheet).

- Samples are typically retrieved weekly (seven (7) calendar days); this may vary depending on project-specific requirements or extraneous events such as holidays, extreme weather conditions, and/or other unforeseen constraints. Collection spans other than seven (7) days must be documented in the field notes.
- Autosampler and grab samples must be collected at the same sampling station on the same trip.
- The autosampler's performance tests, including sample delivery volume checks and re-calibrations, must be conducted at the time of sample retrieval to ensure the accuracy and consistency of samples.
- Discrete samples are pre-acidified and must not be filtered.

1. If an autosampler collects ***nine (9) samples or less***, the samples may be combined in one discrete bottle, capped and homogenized. Proceed to step 3. Depending on the exact volume of the samples collected by the autosampler, it may be possible that the volume from more than 9 samples may fit in the one discrete bottle. If this is the case, the bucket does not have to be used.
2. If ***ten (10) or more samples*** have been collected by the autosampler, the discrete samples must be composited in a bucket using the following procedure:
    - The autosampler processing bucket must be rinsed three (3) times with site water prior to use; this is acquired by pumping site water from the autosampler pump head tubing into the bucket. Sample water from the autosampler discrete bottles **must not be used** to rinse the autosampler processing bucket.
    - Each discrete sample bottle must be capped, shaken and composited into the processing bucket.
3. A small amount of sample is dispensed into a labeled sample bottle. The bottle is rinsed one (1) time, the rinsate discarded and the bottle filled with the sample. The sample in the bucket must be processed into the sample bottle as soon as possible so as not to allow solids to settle in the composite bucket.
4. 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.
5. If the acid-preserved sample has a pH $\geq$ 2; 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 final number of acid drops added to the sample bottle must be recorded in the field notes.
6. If the pH of the sample is < 1.3, the sample must be discarded and an appropriate statement that relates to the pH of the sample must be added to the field notes (i.e., the pH was too low to process).
    - ***The FTD is not required when the sample is discarded***.
    - ***If there is only one aliquot in the autosampler that is over-acidified, a Sample Problem Report does not have to be filled out.***

- ***If there are two or more aliquots in the autosampler and the sample is still over-acidified, a Sample Problem Report must be filled out.***

7. After pH verification, the sample must be submerged to the bottle's neck in ice in a cooler.
8. If a processing bucket/lid was used, it must immediately be rinsed (3) times with AFW, placed in a clean plastic bag and sealed.
9. After sampling the Collector must verify that the program is running as designed and this must be confirmed by a second person. This check must be documented in the COC.

If the volume in the autosampler exceeds the composite bucket volume:

1. Each discrete bottle with sample must be capped and thoroughly mixed.
2. Immediately after each discrete bottle is mixed, a uniform aliquot of sample must be measured using a clean 120 mL sample bottle.
3. The sample bottle is filled to the neck and the measured aliquot is poured into the composite bucket.
4. This aliquot process must be repeated for each discrete bottle containing sample water.
5. The aliquot from the last bottle must be proportional to the number of samples triggered into the bottle. For example, if there are 4 of 8 triggers in the bottle, then the aliquot must be 50% of the other aliquots collected. The proportional amount is not required to be measured with a graduated cylinder and can be estimated using the same 120 mL sample bottle.
6. The composite bucket must be swirled to re-suspend particulates
7. The homogenized sample must be poured into the appropriate labeled sample bottle.
8. This process must be documented as a comment in the field notes, the FPM must be notified upon return to the FOC, and a data qualifier code of PMR (Table 20) must be requested.

5.4 Refrigerated Composite Autosamplers

A refrigerated autosampler may be installed at a station if required by project requirements. This type of autosampler uses a single 5-gallon polyethylene composite jug to collect sample aliquots rather than 24 discrete bottles. The refrigerated samples must be maintained at a temperature between 0^{o}C to $\leq 6^{o}$C. The min/max and current temperatures of the autosampler must be recorded electronically from the HOBO Pendant® Temperature Data Logger (Section 5.9.5 details the HOBO Pendant®).

1. While retrieving a sample, the 5-gallon composite jug must be capped, removed from the refrigerator and replaced with a laboratory-cleaned 5-gallon composite jug.
2. The capped 5-gallon composite jug must be shaken or twisted to homogenize the sample. A small amount of sample water must be dispensed into each labeled sample bottle to allow one (1) rinse; this rinsate must be discarded prior to filling the unfiltered samples.

3. If filtering is required, the syringe is rinsed three (3) times with sample water prior to placing a filter on the syringe. The filter must be rinsed with a minimum of 30 mL of the sample water and the rinsate discarded ***prior to*** filling the corresponding labeled sample bottle.
4. A small amount of filtered sample is dispensed into a labeled sample bottle and rinsed one (1) time. The rinsate is discarded and the bottle filled with the filtered sample.
    a. Samples are preserved as required, homogenized, and checked for proper pH (see Section 4.2.2) before being placed in ice in the cooler.
    b. Samples and field QC blanks to be submitted for NOx (**Grey Bottle**) are to be acidified with a **minimum of 5 drops of H2SO4 in the 60 ml bottle** 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. The used 5-gallon composite jug is returned to the laboratory for cleaning or disposed.

The 5-gallon composite jug must be replaced quarterly with a new laboratory-cleaned jug even if no sample was collected within that quarter.

5.5 Rejection Criteria

Sample collectors are responsible for visually inspecting and accepting/rejecting a sample based on specific criteria (Table 11). The criteria for sample rejection listed in Table 11 are not all inclusive. At any time, if contamination is suspected the sample must be discarded and the suspected contaminate documented. "Contamination" in this context means anything that would make the sample non-representative of the water body. Contaminates may be, but are not limited to excessive vegetation, suspended sediment, biologicals (e.g. fecal material, insect parts, etc.). Questions concerning the rejection of any sample should be directed to the FPM, STS and/or QA Team.

The collection of non-representative samples, if requested by an STS or FPM, ***must be*** documented in the field notes. Unusual conditions (e.g. a decaying carcass, heavy vegetation) that prevent the collection of representative samples must also be documented in the field notes. Non-representative samples would include, but not be limited to:

- Areas of a marsh or canal that are dry to the point where water has formed disconnected pools and/or
- Sampling stations within the STAs, where the main marsh is dry regardless of whether water is in the seepage canal.
    - The District will officially declare dry-out conditions and suspend sampling when this occurs.
    - A Science Technician Supervisor (STS) and/or Field Project Manager (FPM) must be consulted prior to making the decision not to collect samples from mandated sampling stations.

If a sample is rejected, documentation must include the following in the comment section of the COC when applicable:

- The reason(s) for rejecting the sample,
- The reason for rejecting a discrete sample bottle - the remaining discrete sample bottles collected in the autosampler must be composited,
- "Not flow proportional" for a discrete autosampler programmed for flow operations (ACF) when one or more of the bottles have been discarded,
- Which discrete sample bottle was discarded for a discrete autosampler programmed for uniform time-paced intervals (ACT) (e.g. bottle 4 discarded due to insect contamination) and;
- The reason for rejecting the sample for a refrigerated autosampler programmed for flow operations (ACF).

If the sample contains an amount of sediment that does not seem representative of the grab sample or observed condition of the station water, the intake position should be inspected to assure the intake is not too near the bottom.

Backup Grabs – In the event of a sample rejection and if supported by the project-specific guidelines, if the autosampler failed to collect samples and flow is observed at the time of sample retrieval a grab sample must be collected for TPO4 analysis (unless a routine grab has already been collected for TPO4).

Additionally, a Sample Problem Report (SPR) EForm must be completed as specified in the *Electronic Forms SOP* (SFWMD-FIELD-029, Appendix J).

- If a sample is found to contain contaminants after it is submitted to the laboratory and before analysis it may be rejected according to WQM 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
- Data from samples documented as being "not flow proportional" are qualified with a 'PMR' by the field project manager.

Table 11. Sample Rejection Criteria (5.5)

Collection Type	Observation(s)	Field Action	Documentation
Autosampler	Presence of insect(s) or organisms or animal waste	Sampling staff must discard any contaminated discrete bottle(s**).**	

Collection Type	Observation(s)	Field Action	Documentation
	Presence of vegetation particulates	Sampling staff must discard any contaminated discrete bottle(s) if the presence of vegetation makes the sample non-representative of the station.	The following information must be recorded as applicable: • Compositing period for time-composite (ACT) samples • Amount of sample discarded and total volume collected for either ACT or flow proportional (ACF) collection • "Not flow proportional" for flow proportional autosamplers • When the autosampler sample is discarded, the Sample Problem Report (SPR) must be submitted (unless it was for one aliquot being collected and the pH was less than 1.3SU).
	Presence of an unusually high amount of sediment due evidence of unrepresentative sample.	Sampling staff must discard any contaminated discrete bottle(s) if the presence of sediment makes the sample non-representative of the station (e.g. autosampler intake was not in the correct position to collect a representative sample). A description of the evidence used to support this determination must be placed in the field notes.	
	If the pH of the sample is < 1.3	Sampling staff must discard sample and record in the field notes that the pH of the sample was below 1.3 and was discarded.	

5.6 Delivery Volume Check

- Autosamplers must be programmed to rinse the intake tubing twice prior to sample collection and to purge the tubing of residual water once following collection. Exceptions to the two-rinse standard must be specified in a project's operational monitoring plan.
- Autosampler delivery volume must be checked weekly by pumping a grab sample into either a graduated cylinder or another calibrated container that has markings for a volume greater than 110 ml.
    - The delivery volume must be documented in the field notes and must be within 10% of the target collection volume based on project requirements.
    - If the delivery volume is not within 10% of the target volume it must be recalibrated. The recalibration delivery volume must be documented in the field notes.
    - To confirm the delivery volume after recalibration, a 'grab sample' is selected in the Autosampler menu.

5.7 Program Interruptions

- An Autosampler Maintenance and Problem Report as specified in the *Electronic Forms SOP* (SFWMD-FIELD-029) or current hardcopy version, Figure 1 must be generated for any autosampler program that is interrupted or has maintenance issues that prevent the required samples from being collected. Additionally, a brief description of any

modifications performed during a sample collection trip must be documented in the field notes. This may aid the FPM, data validators or field crews in future issues with the equipment at the site.

- The information required for each report includes:
  - Station name,
  - Project code,
  - A/S WQM #,
  - ASSET # (or other identification number if no asset #) and
  - Date of site visit.

- If discrete bottles are removed from the autosampler tub, capped and left in the A/S shelter before the end of the collection span ("Program Complete"), the number of bottles, total number of samples and the FTD must be recorded on the Autosampler Maintenance and Problem Report.
  - When the composited autosampler samples are collected, information from the Autosampler Maintenance and Problem Report must be submitted to the laboratory along with the field notes for that sampling trip.

- Backup Grabs – In the event of a program interruption and if supported by the project-specific guidelines, if the autosampler failed to collect samples and flow is observed at the time of sample retrieval a grab sample must be collected for TPO4 analysis (unless a routine grab has already been collected for TPO4).

AUTOSAMPLER MAINTENANCE AND PROBLEM REPORT

(Maintenance conducted according to Section 6 of the SFWMD-FIELD-QM-001)

Date: Signature: Technician Initials:

Contractor/Agency: SFWMD A/S WQM 3 Digit #: Asset Number:

Station Name: Project: A/S Head Replaced ?:

Replacement A/S WQM 3 Digit #: Replacement A/S Asset Number:

If Replacing/Removing A/s from a Station, Where Will it be Stored ?:

Work Performed: Pulse Settings Changed: Old: New:

Problem Report (if any):

Parts Replaced:

- Peristaltic Pump Tubing P#
- Distributor Arm Tubing P#
- Intake Tubing P#
- Intake Strainer Replaced
- Desiccant Replaced
- Number of Bottles Replaced (if any)

Parts Cleaned:

- Peristaltic Pump Housing/Liquid Detector/Pump Head Rollers
- General Cleaning of Bottle Housing
- Sweep out Autosampler Shelter

Inspections Completed (if applicable):

- Reset Pump Count
- Battery Voltage
- Refrigerator Temperature (Min/Max)
- Internal Battery Expiration Date
- Sample Calibration Volume
- Desiccant Color

Unscheduled Autosampler Program Interruption Documentation (fill in only if applicable):

Total Number of Samples: FST:

Number of Bottles Capped and left in the A/S shelter for Sampling Crew:

Observed bubbles during the pump purge cycle ?: Autosampler Restarted:

Comments:

New Record Submit Version 1.0.3

Figure 1. Autosampler Maintenance and Problem Report (5.7.A)

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5.8 Maintenance

Autosampler equipment must be maintained and, if broken or malfunctioning, must be fixed or replaced as soon as practicable. All autosamplers must be maintained according to the schedule found within Table 12 below. When any modifications, unscheduled maintenance and/or quarterly maintenance are performed on an autosampler, an Autosampler Maintenance and Problem Report Eform must be filled out and included in the trip notebook.

- The information required for each report includes:
    - Station name,
    - Project code,
    - A/S WQM #,
    - ASSET # (or other identification number if no asset #) and
    - Date of site visit.

All tubing EB P-numbers must also be recorded when tubing is replaced.

Types of modifications/maintenance may include:

- Change of tubing and pump count reset,
- Battery replacement and voltage check,
- Desiccant replacement
- Autosampler head-controller replacement.
- Clock time change for DST
- Changing the pulse setting

5.8.1 Quarterly Maintenance Functions

Tubing Replacement:

- All tubing (intake, distributor arm and silicone pumphead) must be replaced quarterly.
    - The silicone-pumphead tubing must be inspected during each sample retrieval trip and additionally changed when pumping degrades the tubing integrity.
    - The visible sections of the Tygon® intake tubing must be inspected during each sample retrieval trip and replaced if there is loss of elasticity, discoloration and/or another condition that might impact the quality of the sample (e.g. algal growth).

Placement of Tygon® tubing / intake:

- The autosampler intake positioning depends upon the goals and specifications of the project, the type of structure and conditions at each station.
    - Intakes at water control structures may be fixed 0.5 m below the historic low mean water level or may be located on a float arm to collect 0.5 m below the water surface.
- Whether the intake strainer is installed via a fixed intake conduit or a floating arm, it cannot be less than 0.5 m above the bottom of the water column.
    - If the initial distance from the intake strainer to the bottom of the water column is < 2 m, the distance must be checked every time the tubing is replaced at that station.
    - If the intake for the autosampler is deployed from a floating arm, precautions must be taken to ensure the intake strainer will remain at a minimum 0.5 m above the bottom.
- The position of the intake strainer must be just outside the intake conduit, no more than 0.5 m from the end of the conduit and not altered during calibration. In addition, the holes of this weighted intake strainer must have a minimum diameter of 0.25 inch (0.60 cm).
- After the intake tubing is properly positioned, the sample calibration volume check must be performed (See Section 5.6 Delivery Volume Check).
- Bubbles must be observed rising in the water from the intake strainer during the purge cycle after the first rinse of the tubing and documented on the Autosampler Maintenance and Problem Report.
- To maintain a constant distance from the tubing intake strainer to the bottom of the water body as specified above, a hose clamp or similar device must be installed inside each autosampler shelter to prevent the tubing from dropping down into or being pulled out of the tubing conduit. The tubing must:
    - Be clearly marked where the clamp is attached so the position of the tubing can be monitored during the deployment period,
    - Be long enough to allow for the removal of the autosampler from the shelter without altering the tubing's position within the conduit,
    - Be situated in the autosampler shelter such that the water will not pool in the tubing after the purge cycle and
    - Be checked before closing the autosampler shelter to ensure the tubing is not kinked or pinched.

Lead Battery

- The battery **voltage** is checked under load (e.g.., while a grab sample is pumped). Replace the battery if the voltage goes below 11V while under load of pump. For lead acid batteries never determine battery health by any light or indicator on charge controller, a voltage test must always be performed with multi meter on DC voltage

setting on every visit. Once a lead acid battery goes below 10.00 volts it should be discarded regardless if charging increases voltage.

- The battery Ah (Amp Hours) must be checked with RC-300 battery capacity load tester if there appears to be any charging or power errors while on site or if the voltage reads below 12.20 while not under load Ah test must show amp hours of at least 60% of total battery Ah or battery must be replaced. Total Ah of battery is marked on outside of battery typically 35 to 50Ah. When conducting quarterly autosampler maintenance trips load test must always be performed regardless of voltage. (lead acid battery only).
- To properly perform load test battery must be disconnected from autosampler and charging system (completely isolated from any other source) i.e. disconnect battery from everything before testing with RC-300 load tester. (lead acid battery only).

Lithium Battery

- If lithium battery is installed at site it must have a lithium compatible solar charge controller.
- As long as lithium battery voltage test or LCD display on lithium solar charge controller shows above 12.20 no other test needs to be performed on battery (Never perform load test with RC-300 battery capacity tester or any other load tester with lithium batteries. Battery health is determined by battery voltage only. Note: some Lithium charge controllers will not have an LCD display to show voltage, instead will have a battery state charge light indicating charge of battery, typically if battery indicator light is green battery it is in good health although it's still recommended to perform voltage test on battery to confirm above voltage 12.2 with multi meter on DC (direct current) voltage setting. Note: Typically, lithium voltage will be higher than 12.2 volts however if site experiences prolonged periods with low sun voltages may go under 12.60 volts until adequately charged again.
- If corrosion and/or debris are present, then the following steps are be completed:
    - The wires are removed from the battery terminals and the connectors are cleaned and coated with silicone grease.
    - The output of the power source (solar panel or battery charger) must be checked and proper operation confirmed.
    - The wires are reconnected, a delivery volume check grab sample is exposure pumped and the battery voltage is checked while the pump is running (under load).
    - The battery is replaced if needed.
- The Program and Software Options must be reviewed for proper programming.

Table 12. Autosampler Required Maintenance Schedule*(5.8)

Instrument	Specific Activity	Frequency
Autosamplers	Battery charge confirmed & replaced as needed	Before / during deployment
	Programming checked	Before deployment
	Pumping volume verified with a graduated cylinder. Re-calibrated if pumping volume is more than +/- 10% from the target volume	Weekly
	Desiccant (humidity) indicator checked & desiccant changed if 30% of the indicator turns light pink or white	Weekly
	Date/Time verified	Weekly
	Verify program started	Weekly
	24 discrete bottles changed out or 5-gallon composite jug changed out	Quarterly / as needed
	Pump head tubing (silicon) and intake (Tygon) tubing replaced	Quarterly / as needed
	Liquid sensor cleaned	Quarterly / as needed
	Battery condition checked, specifically the terminals	Quarterly / as needed
	Autosampler and enclosure cleaned	Quarterly / as needed
	Intake tubing strainer cleaned or replaced	Quarterly / as needed
	Brush/clean out autosampler housing and the autosampler base	Quarterly / as needed

*Changes to autosampler equipment or settings, ***must be documented*** on the Autosampler Maintenance and Problem Report.

5.9 Autosampler Procedures

This section applies to the use of ISCO Autosamplers.

Each time an autosampler is visited:

- Care must be taken to prevent *all* autosampler bottles from being contaminated.
- The autosampler is checked for sample aliquots:
    - If aliquots are present, the FTD and number of aliquots are recorded.
    - Bottles with sample aliquots are removed, the aliquots composited, and samples collected (sample water drawn into appropriate bottle(s) and processed).
    - Remaining deployed discrete bottles are checked for contamination and replaced as necessary.
- The unused autosampler discrete bottles are rotated toward position 1, with new lab-cleaned bottles acidified and added at the end position(s).
- A grab pump sample is collected into a graduated cylinder or another calibrated container with a volume greater than 100ml to check that the calibration is programmed to collect within 10% of the target volume.
- The intake tubing within the clamp attached to the side of the autosampler shelter must be checked for proper placement.
    - If the marked portion of the tubing has slipped beyond clamp, reposition the intake tubing and check proper positioning by using the bubble observation method described in the quarterly section below.

- The desiccant indicator is checked and the desiccant is replaced as necessary.
- The time and date are checked for accuracy.
- The autosampler counts from the SCADA Remote Telemetry Unit (RTU) are recorded from the tube of knowledge.
- The autosampler counts are reset when possible and all information is recorded in the field notes.
- The program is restarted, and the proper bottle start position must be confirmed.
- The autosampler must be carefully placed into the shelter, ensuring that the Tygon® intake tubing runs at a smooth incline up to the autosampler as to prevent pooling in the tubing.
- If any maintenance activities are performed, the Autosampler Maintenance and Problem Report form must be filled out electronically or as a hard copy, which must be disseminated as indicated at the top of the form.
- The **RED** text in the following programming and troubleshooting guide indicates the action to be taken.

5.9.1 Programming and Trouble-Shooting Guide for ISCO 6712 Autosamplers

5.9.1.1 Extended Program 1 - Composite Flow-Proportional (ACF) Sampling

(8 samples/bottle, 24 bottles, 100 mL samples)

During each station visit:

- The Autosampler display should read:

  #*, # BOTTLE #*****

  AFTER # PULSES

Where:
#* = the number of the *next sample* to be collected in the bottle (i.e., one more than the actual # of samples in the bottle)

=** number of samples collected per bottle (i.e., the number should be eight (8) if collecting 100mL per sample)

BOTTLE #* =** the bottle that the next sample will be collected in

AFTER # PULSES = the set number of pulses needed for the autosampler to initiate a sample. This can be set for 1-5. It will vary depending on the program and/or station. The number of pulses should not be changed without direction from the Field Project Manager.

If the autosampler does not display the above, it is not programmed for Extended Programming:

- The red and black **STOP** key **(**  **)** is pressed to back out to the menu below:

  Run
  Program
  View Report
  Other Functions

- At this screen, **6712.2** is typed to enter Extended Program mode.

5.9.1.2 Retrieving the First Trigger Date (FTD) from an Extended Program 1 - Composite Flow-Proportional (ACF) Sampling Program

1. The **STOP** key **(**  **)** is pressed two times to return to the main menu shown below. The blue and white **SCROLL** key ( or ) is used to navigate to **Stop Program**, and the yellow and white **ENTER** key () is pressed**.** The screen will read **Program Stopped** (If no samples have been collected the next several steps may be skipped, and resumed at '5.9.2 Other Responsibilities' below).

   Stop Program
   Resume Program
   View Data
   Grab Sample

2. When the **STOP** key is pressed, the following menu will be displayed. The **SCROLL** key is used to navigate to **View Report**, then the **ENTER** key is pressed.

   Run Extended 1 *(name may vary)*
   Program
   View Report
   Other Functions

3. The menu below is displayed. The **SCROLL** key is used to navigate to **View Data**, then the **ENTER** key is pressed.

   View Data
   System ID
   Configure Report

4. The menu below is displayed. The **SCROLL** key is used to navigate to **Sampling Report**, then the **ENTER** key is pressed.

   Sampling Report

Rain

5. The sampling report is used to obtain the **First Trigger Date (FTD)**, additional information such as when errors occurred or the **Last Sample Time (LST)**. The sampling report will scroll automatically unless the **STOP** key is pushed, which allows manual scrolling. The screen will read **END REPORT** at the end.
6. The **STOP** key is used to back out to the menu shown in **# 3** above.

5.9.2 Other Responsibilities

1. Checking sample calibration:
   a. The autosampler pump tubing is removed from the bulkhead fitting where the tubing enters the center section.

   b. The **SCROLL** key is used to navigate to **Other Functions**, then the **ENTER** key is pressed. The menu below is displayed.

      Maintenance
      Manual Functions
      Software Options
      Hardware

      The **SCROLL** key is used to navigate to **Manual Functions,** then the **ENTER** key is pressed. The menu below is displayed.

      Grab Sample
      Calibrate Volume
      Operate Pump

      The **SCROLL** key is used to navigate to **Grab Sample,** then the **ENTER** key is pressed. The screen will now read **Sample Volume ### mL**. This volume should match the autosampler sample setting. The **ENTER** key is pressed. The autosampler will take a grab sample.

   c. A graduated cylinder is used to measure the volume pumped. An acceptable volume is ± 10 % of the programmed volume (e.g. for a 100 mL setting, the pumped volume must be between 90 mL and 110 mL). If the volume pumped does not fit this criterion, the autosampler volume must be recalibrated.

2. Calibration:

   a. In **Manual Functions,** the **SCROLL** key is used to navigate to **Calibrate Volume** then the **ENTER** key is pressed.

      Grab Sample
      Calibrate Volume

Operate Pump

b. The screen will read **Sample Volume 100 mL**. The **ENTER** key is pressed.
c. The screen will read **CALIBRATE VOLUME.** The **ENTER** key is pressed, causing the autosampler to cycle through the grab sample process and pump an aliquot of water into the graduated cylinder.
d. The screen will then read **VOLUME DELIVERED: _____mL**. The amount of water in the graduated cylinder is input using the number keys, then the **ENTER** key is pressed. The menu below is displayed.

Grab Sample
Calibrate Volume
Operate Pump

e. **Calibration must be confirmed** (step 1. b. above). If the volume is out of range, the autosampler must be recalibrated and rechecked. These steps must be followed until the correct volume is dispensed.

3. Checking the accuracy of the date and time:

a. The **STOP** key is pressed to return to the following menu.

Run Extended 1 *(name may vary)*
Program
View Report
Other Functions

b. The **SCROLL** key is used to navigate to **Other Functions,** then the **ENTER** key is pressed. The menu below is displayed.

Maintenance
Manual Functions
Software Options
Hardware

c. The **SCROLL** key is used to navigate to **Maintenance,** then the **ENTER** key is pressed. The menu below is displayed.

Set Clock
Pump Tube Alarm
Internal Battery
Diagnostics

d. The **SCROLL** key is used to navigate to **Set Clock,** then the **ENTER** key is pressed. The date and time can be adjusted as necessary, specifically for daylight savings time when appropriate.

4. Checking for proper programming, quarterly or as needed (for new or factory returned autosamplers, some default settings are given):

    a. The **STOP** key is pressed to return to the following menu:

        Run Extended 1 *(name may vary)*
        Program
        View Report
        Other Functions

    b. The **SCROLL** key is used to navigate to **Program,** then the **ENTER** key is pressed.
    c. The program should be set for: **Extended Program 1** *(name may vary)*
    d. The units selected length should be**: ft**
    e. The minute interval should be: **1**
    f. The display should read:

        24, **1000** ml btls
        ( ) ft. suction line (length varies by station, defaults to 10)
        Auto suction head
        2 rinses, **1** retries (defaults to zeros)

    g. The display should read**: one-part program**
    h. The display should read (defaults to time):

        Pacing:
        Flow, Every
        (1-5) Pulses
        No sample at start

    i. The display should read (defaults to Distribution: sequential):

        Distribution: 8 samples/bottle

        1. The **ENTER** key is pressed to navigate to the sample distribution sub-menu
        2. The selected bottles per sampling event should read: **1**
        3. The display should read switch bottles on: **number of samples.**
        4. The bottles are switched every: **8 Samples**
        5. Run continuously? **no**

    j. The selected sample volume should read (defaults to 120 ml):

        Volume: 100 ml

    k. The display should now read:

Enable:
None Programmed

l. It should read:

Enable:
Repeatable enable
No sample at disable
No sample at enable

m. It should read:

Enable:
Countdown continues while disabled

n. And:

Enable:
0 Pause & Resumes

o. The display should read:

No Delay to Start

5. Checking the Program Software Options, quarterly or as needed:
   a. The **STOP** key is pressed to return to the following menu:

Run Extended 1 *(name may vary)*
Program
View Report
Other Functions

   b. The **SCROLL** key is used to navigate to **Other Functions,** then the **ENTER** key is pressed. The menu below is displayed.

Maintenance
Manual Functions
Software Options
Hardware

   c. The **SCROLL** key is used to navigate to **Software Options,** then the **ENTER** key is pressed
   d. The display asks if the liquid detector is to be used: **yes**
   e. The measurement interval should be every**: 1 minute**
   f. The dual sampler mode should be: **off**
   g. The bottle full detect should be**: off**

h. The timed back light should be**: on**
i. The event mark setting should be sent for**: complete samples**
j. Pre-sample purge counts should be: **200**
k. Post-sample purge counts should be: **dependent on head**
l. The periodic serial output should be**: no**
m. The interrogator connector should be set to: **power always on**

6. Running the program:

   The **STOP** key is pressed to return to the following menu:

   Run Extended 1 *(name may vary)*
   Program
   View Report
   Other Functions

   Run Extended 1 (or comparable program) is selected using the **SCROLL** key. The screen will display **1, 8 bottle 1, After (1-5) pulses** when the autosampler is restarted.

5.9.3 Other Programming Options: Composite Flow-Proportional Sampling and Uniform Time-Paced Sampling

1. Composite Flow-Proportional Sampling:

   This programming differs from the previous program as it requires one composite bottle instead of 24 discrete bottles. The number of bottles and volume of that bottle must be changed in the autosampler menu. Autosamplers can be programmed to change the number of bottles and volume of that bottle in the sampler menu. This type of program is in the users' manual.

2. Uniform Time-Paced Sampling:
   Autosamplers can be programmed for either discrete (ADT) or composite time-paced (ACT) sampling. These types of programs are in the users' manual or below.

   An ADT is a time-proportional autosampler collecting samples at three (3) hour intervals; aliquots are composited as daily samples (each bottle is processed as a discrete 24 hour time period (ADT) starting at 02:00 AM to avoid issues with daylight savings as set by the FPM following discussions with the data's end user(s). This strategy allows for daily characterization of the water quality canal system independent of flow events, while allowing water quality conditions during short-term flow events to be evaluated. This type of monitoring does not require flow calculations or flow monitoring equipment. Each week the autosampler is stopped to process the previous week's sample and is restarted to begin at 02:00 AM. This means that Day 7 is a shorter timespan than the other 7 days. The discrete bottles within each autosampler are pre-acidified and analyzed for TPO4.

An ACT is an autosampler configured to collect periodic samples or a composite sample of sample aliquots based on a timed trigger. Unless the autosampler is refrigerated and the aliquots are pumped into a single composite container, the sample aliquots are all composited into a single composite sample. The composite sample is then processed into one or more subsamples for submission to the laboratory.

Note: *Refrigerated autosampler samples are* ***not pre-acidified*** *and H_2SO_4 must be added to the sample bottle to lower the pH <2.*

REMINDER: *Pre-acidified samples must not be filtered. The sample is processed as an unfiltered sample.*

5.9.4 Troubleshooting Tips

5.9.4.1 Error Messages

- **Distributor Error** - *when the program started*:

  - **Possible Cause:** Kinked tubing or warped center section
  - **Solution:** The distributor arm tubing should be checked for kinks, etc. and replaced as necessary. The autosampler controller/center section should be checked for correct placement on the base.
  - **Solution:** Running **Diagnostics** on the distributor arm will help determine if the autosampler controller needs to be replaced.

- **Low Battery** – *upon arrival* or while attempting to **Take Sample** or **Run Pump**:

  - **Possible Cause:** Low battery voltage or bad battery connection
  - **Actions:**
    - Check the battery voltage and charger output using a voltmeter.
    - Clean the solar panel including terminal connections.
    - Clean battery terminals and cables; check that connections are tight.
    - Check the time of power failure: samples missed at night are indicative of a bad battery; samples missed during the day are indicative of a charging issue.
  - **Solution:**
    - Replace the charger if output is not at required levels.
    - Replace solar panel if damaged.
    - Replace battery cables and/or tighten connections.
    - Replace the battery if the voltage is below 10V or if the problem persists.

- **Missed Samples** – *during program review*:

- **Cause:** Various, requires system troubleshooting (e.g. Detached or kinked tubing, blocked intake strainer, distributor arm failure and/or power problems)
- **Solution:** The number and time that samples were missed are determined by scrolling through the **Sampling Report**. This should be documented on the autosampler maintenance and problem report and the cause of the missed samples fixed if possible. If the cause cannot be determined, the Field Project Manager must be contacted.

- **No liquid detected** or **Sensor Dirty** – *during program review*:

  - **Cause:** The tubing is crimped, the intake is not in the water, came out of the water during pumping activity or is clogged, pumphead tubing is installed backwards or the sensor needs cleaning. This also could occur because the tubing developed a split or hole.
  - **Solution:** The intake strainer and depth should be checked.
  - **Solution:** The intake strainer depth should be checked against the usual headwater drawdown.
  - **Solution:** The headwater level should be checked for unusual drawdown by the FPM or Field Supervisor.
  - **Solution:** The direction of the pumphead tubing into the pump should be checked to ensure accurate placement.
  - **Solution:** The black pump knob should be unscrewed and the tubing moved to expose the sensor (a small gold colored screen on the base, under the pump tubing) and enable cleaning.
  - **Solution:** The pump tubing should be changed.
  - **Solution:** The autosampler controller should be replaced.

- **Program Complete** – *upon arrival*:

  - **Cause:** The autosampler has collected all programmed samples, filled all bottles and finished sampling.
  - **Solution:** This is occasionally expected if there were large amounts of flow since the last collection. The FTD and Last Sample Time (LST) from the **Sampling Report** should be recorded in the field notes. The sample should be processed normally.
  - **Solution:** The Field Project Manager should be contacted to discuss increasing the pulses to reduce the risk of a "program complete" the following week. Any changes to the autosampler pulses must be noted in the field notes.
  - **Solution:** If the samples were collected quickly in succession, the autosampler controller should be replaced. If this still continues, the telemetry and flow program should be checked.

- **Solution:** Flow calculation or MOSCAD/CR10 programming may be incorrect. A Remedy ticket should be submitted to SCADA for repair via the FPM or STS.

- **Program** Paused– *upon arrival*:

  - **Cause:** The program was not restarted the previous week; power loss or some other event or person caused the program to pause.
  - **Solution:** Additional information can be obtained in **View Report, View Data, Sampling Report**. There will usually be a warning message on the screen regarding power loss. If samples were missed this must be documented on an Autosampler Maintenance and Problem report.

5.9.4.2 Other Issues

- The autosampler **bottles** are **filled to different levels** - *(there may be overflow in the base):*

  - **Cause:** Various (e.g. dirty or faulty water sensor, the distributor arm tubing has become detached, worn Pumphead tubing, there is an incorrect number of bottles, crimped or blocked tubing)
  - **Solution:** The water sensor should be cleaned, as explained under **No liquid detected** above, and the autosampler recalibrated. If the water sensor is faulty, the autosampler controller should be replaced.
  - **Solution:** Twenty-four (24) discrete bottles should be well secured in the base.
  - **Solution:** The distributor arm tubing should be checked to ensure it is the proper length range of 17.75 – 18 inches and is attached to the bulkhead fitting.
  - **Solution:** The distributor arm alignment should be checked using **Run Diagnostics** (**Other Functions** menu, **Maintenance**, **Diagnostics**). If a distributor error occurs during this test, the center section may need to be replaced.

- The autosampler **will not calibrate accurately** - (*two (2) or more failed calibration attempts*):

  - **Cause:** Improper tubing installation or placement, worn or damaged tubing, pooling of water in tubing
  - **Solution:** The pump tubing should be checked for wear and/or damage and replaced if necessary.
  - **Solution:** The intake tubing should be measured to confirm proper length and adjusted as necessary.

- **Solution:** The intake tubing should be checked to ensure it runs at a smooth incline up to the autosampler, and that the tubing hose clamp holds the strainer at the proper depth.

- The autosampler **will not pump any water** through the peristaltic pump:

  - **Cause:** Improper tubing installation, crimped or blocked tubing, the intake is not in the water or is clogged, the pumphead tubing is installed backwards
  - **Solution:** The intake strainer and depth should be checked.
  - **Solution:** The direction of the pumphead tubing into the pump should be checked to ensure accurate placement.
  - **Solution:** The pump tubing should be changed.
  - **Solution:** The autosampler controller should be replaced.

- The autosampler **will not stop pumping** water:

  - **Cause:** Liquid detector malfunction, improper tubing installation, autosampler controller failure
  - **Solution:** The water sensor should be cleaned, as explained under **No liquid detected** above.
  - **Solution:** The pump housing should be secured above the sensor area.
  - **Solution:** The pump tubing should be changed.
  - **Solution:** The autosampler controller should be replaced. If this still continues, the telemetry and flow program should be checked.

- The autosampler is **not confirming / acknowledging samples / counts** - *(CR10, MOSCAD):*

  - **Cause:** Improper software settings, MOSCAD or CR10 programming errors, the event mark is not set correctly
  - **Solution:** The event mark should be checked using the **Other Functions menu, Software Options, Event Mark,** and **After Complete Sample**. Under this setting, a Grab Sample manually taken in the field should show an additional confirmed sample.
  - **Solution:** The autosampler controller should be replaced. The FPM, STS or SCADA can remotely send a trigger to a MOSCAD, or SCADA can send a trigger to a CR10 to see if the requests and acknowledgements increase by one each. If a problem persists, the FPM must be contacted immediately to seek resolution. **Note:** The handheld trigger sometimes utilized in the field will not increase the counts as it uses the same connection as the CR10 or MOSCAD thereby "disconnecting" the counter.

- The autosampler **should have collected samples, but did not**:

- **Cause:** The autosampler may not be receiving signals from the CR10 or MOSCAD, the telemetry is not receiving flow data, the program was not restarted the previous week, there was a power loss or some other event or person caused the program to pause or stop.
- **Solution:** The wiring connections should be checked, specifically the cable from the autosampler to the telemetry.
- **Solution:** The program should be checked to see if it is running.
- **Solution:** A visual check of the Sontek should be made if one is installed.
- **Solution:** The program should be checked for the proper settings.
- **Solution:** The FPM, STS or SCADA can remotely send a trigger to a MOSCAD, or SCADA can send a trigger to a CR10 to see if the requests and acknowledgements increase by one each.
- **Solution:** The autosampler controller should be replaced.
- ***If unresolved, the FPM must be contacted immediately***.

- The autosampler **display** is **searching for hardware** after starting the program:

  - **Cause**: Program may be set to include a rain gauge as part of the hardware.
  - **Solution**: This should be checked using the **Other Functions** menu, **Hardware Options**. If "0.01-inch TIP RAIN GAUGE" appears, the **SCROLL** and **ENTER** keys should be used to select **NO** when asked "Do you have a rain gauge attached?" A warning reading "New hardware setup - - download data now or lose all data!" will appear. The **SCROLL** and **ENTER** keys should be used to select **DONE**, and the program restarted.

5.9.5 HOBO PENDANT® Temperature Data Logger for Refrigerated Autosamplers

For programming, deployment, data retrieval and temperature verification of the HOBO Pendant® Temperature Data Logger refer to the *Sonde Deployment and Data Retrieval SOP* (SFWMD-FIELD-SOP-13, Section 4.7.3 and Appendix 5).

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 measured discretely, typically at the time of sample collection. These field parameters include pH, specific conductance, salinity, dissolved oxygen (DO) and temperature. The data in this section, collected in conjunction with grab samples, are validated by the WQM QA team in accordance with the *Quality Assessment of Field Data SOP* (SFWMD-FIELD-SOP-002). Other parameters measured in the field include total depth, sampling depth, Secchi disk depth and photosynthetically active radiation (PAR). Field instruments are also continuously deployed for extended periods of time. 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 technicians create a log file prior to collecting field parameters using a YSI ProDSS sonde and save the logged field parameters from each site. These saved data can then be transferred from the YSI ProDSS sonde to the technician field computer, and then saved to the WQM Data Dropbox folder. If necessary, these traceable data can be utilized if there is a future correction. Instructions for creating a log file can be found in Appendix B.

6.1 Calibration Definitions and Requirements

Science Technicians 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 13).

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 2014 is used through June 30, 2014, but must not be used on July 1, 2014). Standards that are past their expiration date must be discarded.

6.2 Instrument Measurement Requirements and Guidelines

The following outlines specific procedures for field testing parameters (Summarized in Table 14):

- The manufacturer's instructions for sample measurement must be followed using the specific multi-parameter unit.
- 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 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 13 below.

Table 13. Field Instrument Minimum Accuracy Requirements* (6.2.A)

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
Specific conductance	SW, GW	SM2510B	µS/cm	± 5% of the true value of the KCl standard
Temperature	SW, GW	SM2550B	°C	± 0.2 °C
Salinity	SW, GW	SM2520B	PSU	NA**
Secchi depth	SW	FT 1700	meters	0.1m
PAR	SW	FT 1700	µmoles/m^2s	NA
Turbidity	SW, GW	FT 1600	NTU	NA

SW= Surface Water
GW= Groundwater
* The accuracy objectives are not the same as the calibration acceptance criteria listed in Table 14 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 14. Specific Probe Calibration and Verification Requirements Quick Reference (6.2.B)

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

Parameter	Initial Calibration (IC)	Initial Calibration Verification (ICV)	Continuing Calibration Verification (CCV)
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. every 12 months) verification (against NIST-traceable thermometer) o Level 1: < 15 ºC, o Level 2: approx.40 ºC, o ambient temperature water • Must be within ± 0.5ºC of NIST-traceable readings

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 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.

6.3.2 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 Science Technician Supervisor (STS):

- 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 documented, and the instrument may continue to be used.
    - **If the instrument does not pass the CCV,** the instrument's failure must be documented 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.
- When using paper documentation (not HFDM) all original calibrations and field testing data that are recollected are treated as corrections on the FTR.
- All documentation including the FTR failure spreadsheet must be turned into the laboratory during sample submission.
- ***The WQM 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 (6.3.A)

6.4 Instrument Calibration – General Guidelines

- Instrument operation is detailed in either the instrument's SOP or the manufacturer's calibration instructions.
- All IC/ICV and CCV information should be documented within the Opening and Closing Controls section of HFDM. If HFDM is unavailable for use, the information may be documented within a Field Trip Report (Figure 4). When exercising this option there is no need to include a Date/Time Analyzed for the P-numbers for the OCS and the CCS, as representative of the IC/ICV and CCV, which 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.
    - If the reading is still not within the acceptance criteria for the parameter, the instrument needs to be inspected and another instrument should be used.
- 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.

6.5 Specific Conductance - Calibration

6.5.1 Standards

For field instruments, commercially purchased standard potassium chloride (KCl) solutions must be used. In the laboratory, standards of appropriate conductivities must be prepared per SM2510; AFW is not a standard.

6.5.2 Specific Conductance IC

- Some instruments may require a zero calibration (e.g. Hydrolab).
- The standard KCl solutions used for the calibration and initial calibration verifications must bracket the range of expected sample conductivities 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.
- 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 WQM 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.

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.

6.8 Dissolved Oxygen (DO) - Calibration

DO probes utilized by WQM include luminescence-based optical and Clark Cell dissolved oxygen probes. The narrative below identifies steps specific to each probe type.

6.8.1 DO IC

- Clark Cell: The DO membrane must be checked for wrinkles, tears and/or bubbles. If any are present, the membrane and the KCl solution must be replaced and the membrane must be allowed to equilibrate overnight before calibration and use. Another multi-parameter instrument must be calibrated for that day's sampling trip.
- Luminescence-based: The probe cap must be checked before calibrating a Luminescence-based DO sensor probe. No water should be present between the sensor cap and the clear plastic window at the top of the probe if the cap is sealed properly using the top O-ring seal. If water *is* present, then the cap must be removed and the area thoroughly dried. The cap may require replacement. Refer to the

instrument manual for calibration, use and maintenance requirements of the specific Luminescence-based DO sensor being used.

- 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 overlying, water-saturated air.
- 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 15. 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 15), 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 15.

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 15.

Table 15. Dissolved Oxygen (DO) Saturation (6.8.A)

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

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^{o}C and a range of 0^{o}C to 100^{o}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

Sampling staff ***cannot*** calibrate the temperature probe on the multi-parameter instruments used by the District. If a multi-parameter instrument fails the temperature calibration check, either the probe or the instrument, depending on the manufacturer must be sent to an authorized repair facility for calibration. Temperature calibration verifications must be recorded in the Data sonde Maintenance EForm. ***A temperature probe failure must be reported directly to the WQM 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 science technician supervisor must be notified while the sonde is still in the water bath so the QA Team member and science technician 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 documented. If the assessment by the QAO or the WQM Team determines the procedure is the problem and not the sonde, then we avoid qualifying the temperature data unnecessarily. The QAO or the WQM 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 QA Team for verification of the failure.

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 instrument maintenance logbook (or other record logbook).

The calibration verification is accepted if the instrument reads within ± 0.5 ºC 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., 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 between > 5 ºC and ≤ 10 ºC and the high temperature must be performed with a hot water bath between >35 ºC and ≤ 42 ºC. Additionally, the ambient temperature verification must be performed and the information recorded in the Datasonde Routine Maintenance Eform.

The calibration verification is accepted if the instrument reads within ± 0.5 ºC 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 new probes must be checked for high, low and ambient temperatures before they are utilized***. ***When an instrument is retired, it must be checked for high, low and ambient temperatures before it is retired.***

6.11 Photosynthetically Active Radiation (PAR)

Measurement of light penetration is covered in detail in the *PAR Data Collection SOP* (SFWMD-FIELD-SOP-026).

6.12 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. 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.). 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.

6.13 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 do not 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 in unapproved, in situ probe method and is only an estimate of the concentration of the analyte.).

6.14 Deployed Instrumentation

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

- For extended deployments, calibrations must be completed prior to deployment and verified at the end of deployment or every 30 days for longer deployments.
- Calibration verifications (CCV) must be concluded prior to cleaning the instrument.
- All field data must be confirmed using acceptable verifications (refer to Table 13).

6.15 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 documents each discrete depth, the 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".

6.16 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.
- Sunglasses must be removed. 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 noted 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 entered as the Secchi disk depth value. The datum is then qualified with a 'S' qualifier in the database.

6.17 Equipment Maintenance

Regular monthly 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 16.

6.17.1 Maintenance Documentation

Field instrument maintenance activities must be documented in the Datasonde Routine Maintenance Eform in accordance with the *Electronic Forms SOP* (SFWMD-FIELD-SOP-029). The following ***must be*** documented 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
- 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

Additionally, all vendor service records *must be* **maintained.** Service reports for repairs that cannot be performed by WQM personnel must be kept on file at the base of operations. The information recorded for rental equipment must include:

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

Table 16. Multi-Parameter Instrument Maintenance Schedule (6.17.A)

Instrument	Specific Activity	Frequency
Hydrolabs (all models)[1]	DO probe membrane and electrolyte changed	Monthly[2] / as needed
	Luminescence-based DO sensor cap replaced	Annually / as needed
	pH and reference electrodes cleaned with Liquinox	Quarterly / as needed
	pH reference electrode refilled with 3M KCl	Quarterly / as needed
	Outside surfaces cleaned and rinsed with AFW	Daily, when used
YSI Multi-probe Instruments[1]	pH and reference electrodes cleaned with Liquinox and soft brush, rinsed thoroughly with AFW	Monthly[2] / as needed
	DO membrane and electrolyte solution changed	Monthly[2] / 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[2] / as needed
In-Situ Aqua Troll 100 and 200 TruBlue 285 CT Data Logger TruBlue 585 CTD Data Logger	Conductivity probe cleaned with dilute Liquinox and soft brush, rinsed thoroughly with AFW	Monthly[2] / as needed
In-Situ Aqua Troll 600	Conductivity probe cleaned with dilute Liquinox and soft brush, rinsed thoroughly with AFW	Monthly[2] / as needed
	pH and reference electrodes cleaned with Liquinox and soft brush, rinsed thoroughly with AFW	Monthly[2] / as needed
	pH reference electrode refilled with 3M KCl	Quarterly / as needed
	Outside surface of DO probe cleaned with AFW	Monthly[2] / as needed
	Luminescence-based DO sensor cap replaced	Annually / as needed
	Outside surface of turbidity probe cleaned with AFW	Monthly[2] / as needed
	Outside surface of chlorophyll probe cleaned with AFW	Monthly[2] / as needed
	Outside surface of BGA probe cleaned with AFW	Monthly[2] / as needed
LI-COR Sensors	Returned to an authorized repair facility for calibration	Every two years

NOTES:

1. Multi-parameter units deployed over a long-term must have their internal batteries changed annually or according to manufacturer's specifications.
2. Scheduled monthly maintenance is recommended if an instrument is used frequently.

6.18 Standards Documentation and Storage

Specific conductance and pH standards must be initialed and dated when received (and again when opened) 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 WQM 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_120814_FOC **or** Biopharm_120814_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_120814_J2514C_OKEE **or** pH_10_120814_K2354L_FOC).

Storage specifications of standards used for instrument calibration are listed in Table 17. All standard containers must be clearly labeled with their contents, the date opened and the expiration date.

Table 17. Standards Storage (6.18.A)

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.

6.18.1 Standard Set Identification

The system shown in Table 18 must be used for tracking lot information of calibration standards. 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
- Date and initials

From this list, a standard set identification number (SSID) 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 SSID assigned. 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. Information in the logbook must be carried down (drawn down with arrow) until the next new container of standard or buffer solution is opened. This SIDD number must be documented on the FTR for the sampling trip.

Table 18. Example of Standard Set Identification Form (6.18.B)

		Fisher pH Solutions			*Biopharm Conductivity Solutions (uS/cm)*			
		4.00	**7.00**	**10.00**	**720**	**2000**	**6680**	
		Catalog #	Catalog #	Catalog #	Catalog #	Catalog #	Catalog #	
		BB 8872	BB 8871	BB 8870	BC4095	BC4095	BC4095	
Initials	**Opened Date**	**LOT #**	**LOT #**	**LOT #**	**LOT #**	**LOT #**	**LOT #**	**Standard Set Identification**
JD	**MM/DD/YY**	**Exp. Date**	**Exp. Date**	**Exp. Date**	**Exp. Date**	**Exp. Date**	**Exp. Date**	
		Rec'd Date	**Rec'd Date**	**Rec'd Date**	**Rec'd Date**	**Rec'd Date**	**Rec'd Date**	
MM	10/09/19	L0123	K5678	M9015	J5678	D1234	L0952	FOCA100919
		11/21	10/21	9/21	4/21	8/21	7/21	
		9/15/19	9/15/19	9/15/19	8/22/19	8/22/19	8/22/19	
JD	03/18/20	↓	L7342	↓	↓	↓	↓	FOCA031820
		↓	10/21	↓	↓	↓	↓	
		↓	1/11/20	↓	↓	↓	↓	
HM	5/03/20	↓	↓	↓	↓	L6492	↓	FOCA050320
		↓	↓	↓	↓	5/22	↓	
		↓	↓	↓	↓	3/31/20	↓	
BB	08/07/20	↓	↓	K5565	L5309	↓	↓	FOCA080720
		↓	↓	3/21	6/21	↓	↓	
		↓	↓	5/01/20	6/15/20	↓	↓	

Section 7: Documentation

7.0 Documentation

Documentation must be completed for each sampling 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 documents is not acceptable under normal circumstances since the expectation that all original documentation is submitted to the laboratory along with the samples. Any non-standard documentation must meet the minimum documentation requirements specified in this section and must be approved by the WQM QA Officer (QAO).

The types of documentation produced by Water Quality Monitoring (WQM) 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 documentation. Records produced by WQM must be archived and retained in accordance with the *Archive Records Storage and Retention SOP* (SFWMD-FIELD-SOP-022).

7.1 Sampling Reference Documentation

The Water Quality Monitoring Quality Assurance (WQM 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 WQM 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 WQM 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 (WQM QAO). Superseded versions of these documents are also housed electronically by WQM QA. The WQM SharePoint team site documents are synched with WQM field computers enabling staff to seamlessly access the current versions.

7.1.1 WQM Controlled Documents

Controlled documents are those whose distribution, use, and fate need to be maintained by an organization. For example, SOPs, quality manuals, monitoring plans and other technical

documents ***must be*** controlled to prevent unauthorized alteration or use of outdated copies. QA 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 QA document must be relayed to a supervisor or a member of the QA Team. The *Electronic Forms SOP* (SFWMD-FIELD-SOP-029; Appendix K: Document Signature Form) details the procedure for using the document signature form for acknowledgment of a controlled document or documents (e.g. SOPs).

Supervisors and the QA Team are responsible for technical staff having and using the latest controlled copies, and ensuring obsolete copies are removed from the WQM 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 WQM field staff are responsible for having access to the WQM Control Documents folder in SharePoint, therefore, supervisors and their direct reports are responsible for creating a WQM Controlled Documents folder that automatically synchronizes to the WQM 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 WQM 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.

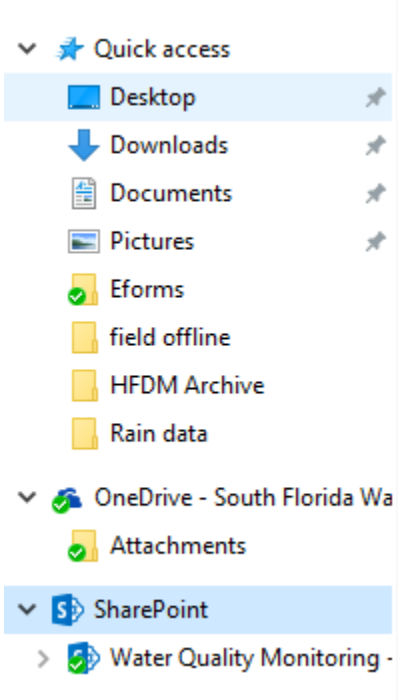
The WQM QAO will keep a superseded version of the current version of each QA document. Documents used by the field technicians are described in Section 7.1.4. These processes are described in *Archived Records Storage and Retention SOP* SFWMD-FIELD-SOP-022. Changes to policies and/or procedures are considered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

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.

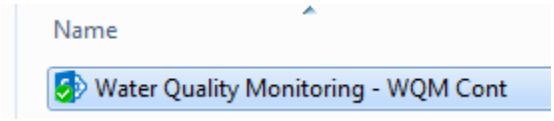
- Click on the windows explorer icon on your Taskbar to open the windows explorer window

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



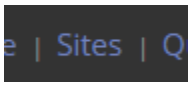
  - If the SharePoint link is not available go to the steps on how to sync the ‘Controlled Documents’ library

- 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



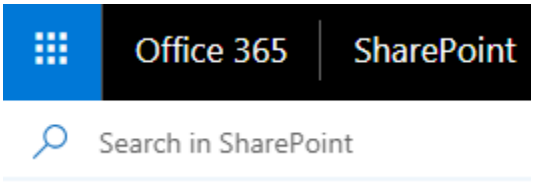
How to Sync the ‘Controlled Documents’ library to the Windows 10 ruggedized field computers

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

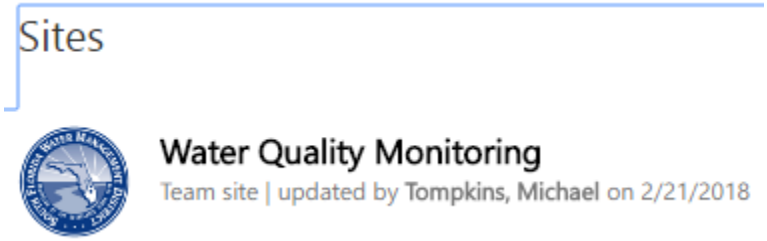


- Sign in using your District credentials if prompted

- At the top left you can search for the ‘Water Quality Monitoring’ team site if it is not displayed anywhere

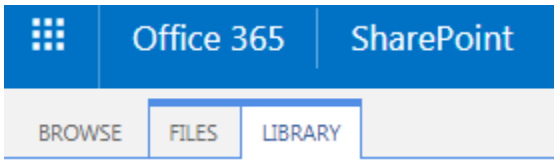


- Click on the Water Quality Monitoring team site from the available list



- 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



- 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 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, 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 must be approved and signed prior to implementation, are reviewed annually, and revised as needed. The current versions are housed within the SOPs library, located within the WQM Controlled Documents library on the WQM 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 are reviewed and revised on an annual basis or more frequently when changes in requirements, scope or protocols are warranted.

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 WQM SharePoint team site.

https://sfwmdoffice.sharepoint.com/sites/collab/wqm/Shared%20Documents/Templates/CMP%20Template%20CMP-001.docx

The template specifies the structure and content of the monitoring plans. Templates for creating new monitoring plans are located within the PM Share folder, located within the WQM Controlled Documents folder on the WQM SharePoint team site.

7.1.6 Electronic Signature

The requirements for electronic signature used by WQM are in accordance with the specifications required in FDEP SOP FD1200.6. Electronic Signatures as employed by WQM 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 will be 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 WQM staff:

- Controlled Documents
    1. The QAO emails the final signed PDF of either an SOP or FSM to an Admin to post in the WQM Controlled Documents library.
    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 QA Team emails an Acknowledgement Signature EForm to the appropriate WQM 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.
5. The FPM emails the Field Supervisor(s) responsible for collecting samples for the Project with notification of the updated Project Monitoring Plan.

7.3 Sampling Related Documentation and Records

A verifiable documentation trail must be maintained for each sample from the time of sample collection through sample submittal to the analyzing laboratory. This is accomplished through the creation and use of a COC associated with the appropriate field notes, FTR, and sample labels.

The Eform (non-HFDM electronic forms) is the primary document of record. Information must not be transcribed from paper records to the Eform unless there are unusual circumstances (e.g. computer failure). If this is done, a comment must be added that the Eform is not the original record.

Handwritten entries of all field records must be printed (not written in cursive) using permanent, waterproof ink. ***All corrections made prior to submission must be struck through with a single line, initialed and dated (month/day/year) by the person making the correction.*** This person must be a member of the sampling team, and preferably the person who made the error.

If any records are transferred/transcribed from one place to another the place where the information is transcribed must contain a note specifying where the information came from. The original records must be submitted and/or retained so they can meet the requirements in the *Archived Records Storage and Retention SOP* (SFWMD-FIELD-SOP-022).

7.3.1 Minimum Field Documentation Requirements

All personnel responsible for collecting environmental samples and field measurements for WQM projects shall adhere to minimum requirements for field documentation.

Typically, sampling trip information is documented within District approved software. The currently approved software is the Horizon Field Application (HFDM). The *Horizon Field Data Manager SOP* (SFWMD-FIELD-SOP-018) provides instructions on how to use HFDM. Surface water sampling for OLIT and/or any other marsh sampling projects documentation is typically recorded on a MSWFS etc, and then entered to HFDM, during processing of the samples.

If ambient conditions and/or station access require data to be handwritten on a QAO approved paper form, the paper copy ***must be submitted*** as original documentation. When data are transcribed from a paper form into HFDM for Laboratory Information Management System (LIMS) upload, both the paper form and the HFDM ***must be*** cross-referenced with a statement appearing on both documents confirming the information was transferred from another document (e.g. " First Trigger Date and time transferred from autosampler maintenance form", or "instrument malfunction in the field"). Any non-standard documentation used must meet the minimum documentation requirements specified in this section and ***must be*** approved by the QAO.

The information in the following list ***must be*** included on all documentation as applicable:

- **Project Name** (e.g. STA6)
- **Date** (mm/dd/yyyy)
- **P#####:** The unique pre-login number generated by LIMS assigned for the sampling trip
- **Sample Frequency:** The corresponding frequency of the sampling trip(s)
- **Collectors:** The LIMS registered collector number of the person or persons filling out the documentation and/or performing the tasks
- **Equipment**:
    - The type of equipment used and unique identification/lot numbers (if applicable)
    - Equipment recorded must include intermediate bottles used to collect sample that is later transferred into a sample bottle. These are recorded under "Other" and should be recorded as "2 liter bottle" or "1 liter bottle" as appropriate.
    - The filter manufacturer and lot number used for each sampling trip listed in the equipment section.
- **Acid**:
    - The type of acid(s) and the lot number(s) used for sample preservation on each sampling day
    - The amount of acid added to each bottle type for all samples on a sampling day. Acid drops must be documented. The drops represent the amount of acid added to the samples collected on that sampling day unless noted otherwise in the field notes for the specific station.
- **Sample #:** The hyphenated suffix of the P-number
- **Station Name:** The COC station code, previously registered in the LIMS system
- **Time:** 24-hour format (e.g. 1430) - corresponding to the same time labeled on the sample labels and COC, which is the default time in HFDM. The exception for the 24-hour format is the FTD (MM/DD/YYYY HH:MM:SS AM/PM and the AM/PM must be capitalized.) The time of sample collection may be different than the time

of field test data collection. Sequential actions cannot have the same time (e.g. ADT samples, samples and replicates, etc.)

- **Signature:** The collector's signature/initials and the date at the bottom of the page(s)
- For records other than the COC/FTR and field notes (cleaning logs maintenance logs, etc.), the information entered must be initialed or signed as indicated.
- **Reviewed By:** The signature of the person responsible for reviewing the Chain of Custody, FTR, field notes and any other field records prior to submittal.
    - If there is only one person documenting and collecting the samples, and there is no other person to review the documentation, he/she should review the document for accuracy and sign again in the "Reviewed by" space prior to submittal.

7.3.2 Chain of Custody Entries

A COC is generated either by 1) printing from the report portal (Actuate) or run report through LIMS (Figure 3) or 2) printing directly from HFDM. The COC tracks the samples from collection to submittal to the laboratory and identifies the person(s) responsible for sample collection. It **must be** signed, dated and reviewed for accuracy before transmittal, and must accompany all samples.

The collector must use a COC to document pertinent field data such as, but not limited to, station codes, date and time of sample collection, and sample ID numbers. Sampling events (with multiple projects) conducted on the same day by the same sampling crew are generally documented on a single COC (single P-number/LIMS event), which is highly recommended. If two or more P-numbers are used for a single -trip (i.e. same day, same sampling crew, same sampling methods), the additional P-number(s) must be referenced on the other P-number(s) records so it is clear another P-number(s) was collected on the same date.

- **Two P-numbers, One or more Blanks:** If two or more projects are collected by one field crew on one trip and have separate P#s the following protocol must be followed:
    - Any QC sample blank (EB/FB/FCEB) collected must be related to all projects by documenting the blank(s) on one COC and canceling the blank(s) on all other COCs; cancelled blanks must not be treated as NOBs.
    - All sampling equipment must be incorporated in the blank(s).
    - If a blank is collected on one of the P-numbers (e.g. P55555-11), **a comment must be made in the NOTES section for each sample Dash # on the other P-number** to reference the QC sample. This comment is not included on non-sample P-numbers (e.g. NOBs, FP, OCS, CCS, etc.).
    - The comment must consist of the P # and dash # to reference the blank collected (e.g. refer to P55555-**11** for FCEB).
    - A comment must also be added to the blank referencing the P-number it is associated with (e.g. Blank associated with P12345)

- All parameters must be included in the blank(s). This may cause an unexpected change or addition of one or more of the following in the field: tests, label, bottle, etc. (e.g. P55555-11 did not have TOTAS in the tests, but the other COC did, so TOTAS must be added to P55555-11) possibly necessitating an additional bottle and label or handwriting Tests on existing sample bottle.

- **Station visited, no sample collected:** Samples ***not*** collected from a visited station must be documented as ***no sample bottles (NOB)*** on the COC.

  - In *HFDM*, to NOB a sample: Tap/click **Sample Actions**, a pop-up menu will appear, select **Cancel** sample. Choose **No Bottle** as the cancel reason. A comment must be entered in the Notes section. The number of bottles must be recorded as zero (0).
  - For *handwritten* documentation**,** the NOB's P-number must not be cancelled, rather the number of bottles must be recorded as zero (0) and the tests are struck through with a single line, which must be initialed and dated by the person making the correction.
  - If a site is observed to be dried out, NOB is selected with a comment similar to "dry-out condition, site not sampled, determined by notifying the STS and FPM, visual observation with digital images taken".
  - A comment ***must be*** made in the Notes section of the COC to indicate why a sample was not collected, such as "No sample in autosampler".
  - If QC of any type is not collected for any reason, the ***QC sample (e.g. EB/FB/FCEB/RS) is cancelled*** and ***not treated as a NOB***.

- **Station NOT visited, no sample collected: For sites that are not visited/not sampled / NOBs:**

  - In *HFDM*, to NOB a sample : Tap/click **Sample Actions**, a pop-up menu will appear, select Cancel sample. Choose **No Bottle** as the cancel reason. A comment must be entered in Notes section.
  - If a site is known to be dry, but it is not visited, NOB is selected with a comment similar to "dry-out condition, site not sampled, determined by (source)".
  - The time 00:00 ***should not*** be entered for any stations not visited since this will be uploaded into DBHYDRO.
  - If QC of any type is not collected for any reason, the ***QC sample (e.g. EB/FB/FCEB/RS) is cancelled*** and ***not treated as a NOB***.
  - Also, 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.

- **Recorded Flow Station NOT visited, no sample collected:** For sites that are recorded flow determined remotely and ***not*** **visited** / ***not*** **sampled** / ***NOBs***:

  - In *HFDM*, to NOB a sample: Tap/click **Sample Actions**, a pop-up menu will appear, select **Cancel sample**. Choose **No Bottle** as the cancel reason. A comment must be entered in Notes section. The time entered is the time the determination was made not to visit the station. This time could be before leaving the base of operations.
  - Must add comment "Station not visited".

- If QC of any type is not collected for any reason, the ***QC sample (e.g. EB/FB/FCEB/RS) is cancelled*** and ***not treated as a NOB***.

These processes are described in the *Sampling Flow Related Stations SOP* (SFWMD-FIELD-SOP-027).

- **Parameters were not collected:** Tests listed on the COC, but no samples were submitted for analysis:
  - On the printed COC, when a sample is NOB or CANCEL, the Tests will be replaced with NOB or CANCEL. When there are Tests not requested they must be crossed off with a single strikethrough line, initialed, and dated by the person making the correction.
  - The space next to "Parameters crossed out and/or "NOB" and "Cancel" added prior to submittal by:" may be initialed instead of initialing and dating each correction PRIOR TO SUBMITTAL OF SAMPLES. When a sample is a CANCEL on the COC the P-number does not need to be crossed off.

No field PSR:

The following glossary of codes applies to the use of District PSRs. In cases when an external laboratory requires the use of its COC forms, the same codes and information must be entered.

This glossary is organized in the order in which the codes appear on the COC.

WORK ID– P##### (at top of page): A unique number generated by LIMS during the pre-login process and assigned to a specific sampling trip

Collector 1, 2, 3 (at top of page): The LIMS registered collector number of the person(s) who performed the sampling trip.

Sample ID (i.e., P-#####-##)**:** The unique number generated by LIMS during the pre-login process and assigned to a sample.

Project: The code(s) identifying the project(s) sampled during a trip. The station must be associated with the project code in LIMS.

Col. Date/Time: The month, day, year and time a sample is collected or the time it is determined that a sample will **not** be collected (NOB or Cancel), or site will **not** be visited. Time is recorded to represent local time in the 24-hour format.

Station: A station code (8 characters or less) registered in LIMS before samples are submitted, and associated with the project in LIMS

UD: A code designating where a sample was collected with respect to a reference structure as defined by the project's monitoring plan. The UD code does not relate to the direction of flow, but reverse flow goes into the comments. Collection

stations that lack a reference structure (e.g. coastal sampling station) are designated undefined. Valid codes are:

0 or null (blank) Undefined -- no observation, coastal or interior (e.g. marsh) sampling station, rain sample collection, no sample is collected or EB, FCEB and FB sample types
1 Upstream
2 Downstream

DS (Discharge): This code is not required and the space is left blank.

WE (Weather): This code is not required and the space is left blank.

Type: Sample type. Valid codes are:

CCS	Closing Control Sample
EB	Equipment Blank
FB	Field Blank
FD	Field Duplicate
FCEB	Field Cleaned Equipment Blank
OCS	Opening Control Sample •NOTE: Never CANCEL the OCS, even if there are no Field Data associated. The OCS must be NOB if there are no field data. Always CANCEL the CCS when there are no Field Data associated.
RS	Replicate Sample
SS	Split Sample
SAMP	Regular Sample
TB	Trip Blank

Program: A code describing the program type. Valid codes are:

EXP	Experimental/Research
MON	Monitoring
NR	Not Reported Data

Method: The one to three letter code for the sample collection method. The OCS and CCS are blank for Method. Valid codes are:

ACF	Autosampler Composite Flow Proportional
ACT	Autosampler Composite Time Proportional
ADT	Autosampler Discrete Time Proportional
ATF	Autosampler Composite Time Flow
CIC	Composite Integrated Core – Sediment/Soil Only
COR	Sediment Core Sample – Not Composited
ELC	Electroshock
G	Grab
GP	Grab Pump
HAL	Hook and Line
UKN	Unknown

WET	Wet (Atmospheric Deposition/Rain)
FP	Field Parameters (*In situ* Measurements, No sample)
NET	Seine or Dip Net
TRP	Trap

Matrix: The two or three letter code for the type of material being sampled. The OCS and CCS are blank for Matrix. Valid codes are:

SE	Sediment
SO	Soil
GW	Groundwater
SW	Surface Water (for stations upstream of coastal flow control structures)
RA	Atmospheric Deposition (rain)
SA	Saline (for stations downstream of coastal flow control structures)
DI	Analyte Free Water (for water matrix blanks)
BPL	Biological – Plant
BFI	Biological – Fish
BAN	Biological – Animal
BFE	Biological – Feathers
BAL	Biological – Algae
PW	Porewater

DI is the matrix listed on the PSR for QC blanks collected for the SA, GW, SW and RA matrices.

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. If the autosampler sample is discarded, the FTD is not required.

Depth: Sampling depth is measured from the surface water down, where a grab sample is collected and/or the field instrument parameters are taken. Depth ***must not be*** recorded for autosampler samples, groundwater samples, blanks and stations where grabs are not collected. For marsh samples collected by direct grab, the sampling depth is defined as half the Tdepth.

Tdepth: The total water column depth required for certain projects as specified in the monitoring plan. Tdepth ***must not be*** recorded for autosampler samples, groundwater samples, blanks and stations where grabs are not collected.

SDD: Secchi disk depth is measured for specific projects only. When the Secchi disk is visible on the bottom, "SOB" or "**S**ecchi **O**n **B**ottom" is recorded in the COC Comments and the total depth is entered in the SDD field.

 # Bottles: The number of bottles submitted to the laboratory for the Sample ID. If no bottles are submitted (NOB or cancel), the # Bottles must be recorded as 0 (zero).

NOB: No bottle submitted:

- For *handwritten* documentation
    - the P-number is not cancelled,
    - the number of bottles is recorded as 0 (zero) and
    - the tests are struck through with a single line, which are initialed and dated by the person making the correction.
      Place "NOB" on the ACODES or in the comments line

The NOB code is used to designate that No Bottle was collected 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.). Also, 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.

A sample may be designated as NOB in cases where the station did not meet a specified recorded flow criterion for the flow decision time span. In these cases, the station may not be visited on the recorded NOB date/time if the "recorded flow" status was determined remotely. Recorded flow at a station is assessed in accordance with the *Sampling Flow Related Stations SOP* (SFWMD-FIELD-SOP-27).

ACODES: A list of analytes being requested for sample analyses; these codes must accurately reflect the samples submitted. Changes made to individual pre-printed ACODES listed for a sample must be treated as corrections.

COMMENTS: Any additional information concerning the *sample* or *station* that may directly affect the quality of the *field parameter results* or the *sample* (e.g. for coastal stations, comments must include tide information when applicable). Other comments may include information that needs to be conveyed directly to the laboratory.

Parameters Crossed Out By: Initials of the field sampling technician responsible for crossing off any ACODES on the date of collection only.

Collector Initials (non-signature pages only): Initials of the field sampling personnel responsible for collecting the samples.

Field Collection Signatures: *The following information is completed by the field sampling staff:*

> **Field Collector:** The signature of the technician (or other sampling personnel) responsible for collecting the samples and/or data and completing the PSR, followed by the date and time completed. This signature confirms (or attests) that all information was checked, follows FSM procedures, and is truthful and accurate.

Field Documentation Reviewed By: The signature of the person responsible for reviewing the PSR prior to its submittal to the laboratory, followed by the date and time completed, signifying the document was reviewed for accuracy. This signature confirms (or attests) that all information was checked, follows FSM procedures, and is truthful and accurate. In cases where there is only one technician involved in the documentation and sample collection process and there is no other person to review the documentation, he/she should review the document for accuracy before signing the "Reviewed by" space prior to submittal.

Samples Relinquished By: The signature of the person responsible for submitting/shipping the samples to the District laboratory and/or shipping the samples to a contract laboratory, followed by the date and time completed. This signature confirms (or attests) that all information was checked and sample custody was released to the laboratory. This is left blank if no samples are submitted (i.e. submission is all NOB).

Transport and Shipping Information: *The following information is completed by the field sampling staff:*

Hand Transport: Samples transported/shipped on ice (initial):

- The initials of the person who transported and hand-delivered the samples in ice to the FOC laboratory.

Courier Shipment: Courier Name: The name of the shipping courier who is transporting the samples to the FOC laboratory.

Other: Separate tracking number for multiple cooler shipments or any other pertinent information

Custody Seal Applied (initial): The initials of the person who signed, dated, and applied the custody seal label to the shipping cooler(s)

Tracking Number: The unique ID assigned by the courier and located on the shipping waybill

Delivery Conditions and Information: *The following information is completed by either field sampling staff or laboratory log-in staff:*

Evidence of sample cooling (ice present in cooler) at the time samples were removed from the cooler - Y/N: The initials of the person removing the samples from the cooler confirming the presence of ice.

Notes on delivery temperature or other conditions: Notes for concerns due to inadequate temperatures, etc. (e.g. delayed deliveries or samples with insufficient ice).

HFDM Upload (initial): Field: Lab: Comments: The initials of the person who relinquished the HFDM trip and Comments.

Manual LIMS Entry (initial): Comments: The initials of the laboratory log-in person who manually entered the HFDM and Comments.

Log In/ Receiving (Lab Use Only): *The following information is completed by the laboratory log-in staff:*

Samples Received by: The ***mandatory*** signature of the laboratory sample receiving custodian, signifying the samples were received by the laboratory.

Custody Seal Intact (courier shipments only) (Y/N): This signifies the custody seal was intact when samples were received by the laboratory. This ***must be*** completed by the laboratory sample receiving custodian.

Preservation Check (initial): The initials of the laboratory sample receiving custodian, signifying the samples were checked for proper acidification.

Acidified (Y/N): This signifies whether the samples received were acidified.

Temperature check bottle present: **Yes ____ºC No____:** This documents the temperature of a bottle shipped with the samples to the receiving laboratory.

Documentation, labeling, missing items or other issues noted at login: Any comment not outlined above should be placed on this line (e.g. switched samples and blanks, no bottle submitted, out of hold sample, etc.).

7.3.3 Field Test Report (FTR) Entries

The FTR documents in situ ambient physiochemical measurements taken in the field (e.g. DO, Temp, pH and specific conductance) for most projects. Additionally, the calibration and calibration verification for the field multi-parameter instrument must be documented on the FTR. This report is either:

1. Entered electronically in HFDM and then relinquished into LIMS (Figure 4), or
2. Handwritten on a pre-printed FTR and manually entered into LIMS by the laboratory login staff.

It is recommended that technicians create a log file prior to collecting field parameters using a YSI ProDSS sonde and save the logged field parameters from each site. These saved data can then be transferred from the YSI ProDSS sonde to the technician field computer, and then saved to the WQM Data Dropbox folder. If necessary, these traceable

data can be utilized if there is a future correction. Instructions for creating a log file can be found in Appendix B.

Field Test Report

Sample Analyst: Remus Lupin
IC/ICV Analyst: Remus Lupin
CCV Analyst: Remus Lupin
Instrument ID#: 417376

IC/ICV Location: Lab Name
IC/ICV Solution Set ID: LAB052520
CCV Location: Lab Name
CCV Solution Set ID: LAB052520

Acceptance Criteria:
DO +/- 0.3 mg/L
Specific Conductance +/- 5 Percent
pH +/- 0.2 pH Units

Field Sample ID	Tvalue	Precal Reading (IC's only)	Sp Conductance (uS/cm)	Dissolved Oxygen (mg/L)	pH	Temperature (Degrees C)	Salinity (ppt)	Redox (mV)	Date/Time Analyzed	P/F
IC 1 (COND)	2000	1998	2000						05/25/2020 0631	P
IC 2 (COND)										
ICV 1 (COND)	100		99							P
IC 1 (pH)	7	6.99			7					P
IC 2 (pH)	10	9.98			10					P
IC 3 (pH)										
IC 1 (DO)	8.863	8.66		8.86		21.3				P
P123456-2			356	8.37	7.4	24.3			05/25/2020 0841	
P123456-3			878	8.24	7.2	25.1			05/25/2020 1023	
P123456-4			598	8.14	6.7	25.8			05/25/2020 1154	
P123456-5										
CCV 1 (COND)	2000		1999						05/25/2020 1503	P
CCV 2 (COND)	100		98							P
CCV 3 (COND)										
CCV 1 (pH)	4				4					P
CCV 2 (pH)	10				10					P
CCV 1 (DO)	8.88			8.85		21.2				P

Signature: Remus Lupin Date: 5/25/2020 Reviewed By: Sirius Black Date: 5/25/2020

Figure 3. Example of a Field Test Report (FTR) (7.2.3.A)

Glossary of Codes for Completing a pre-printed Field Test Report

Sample Analyst: The personnel responsible for collecting the field test data.

IC/ICV: The specific location of the **I**nitial **C**alibration (**IC**) and the **I**nitial **C**alibration **V**erification (**ICV**) of the multi-parameter instrument (e.g).

IC/ICV Analyst: The LIMS ID number of the analyst who performed the multi-parameter instrument IC/ICV.

CCV Analyst: The LIMS ID number of the analyst who performed the multi-parameter instrument **C**ontinuing **C**alibration **V**erification (**CCV**).

Field Sample ID (also referred to as P-Number)**:** The unique sample number generated by the LIMS system.

Tvalue: The true value of the calibration standard or buffer used for the IC, ICV or CCV.

Sp Conductance (µS/cm): The specific conductance (COND) reading from the multi-parameter instrument after calibration.

Dissolved Oxygen (mg/L): The Dissolved Oxygen (DO) reading from the multi-parameter instrument after calibration. This reading is also the ICV for the calibration

pH: The pH reading (units) from the multi-parameter instrument after calibration the last reading of which is the ICV.

Temperature (°C): The temperature reading from the multi-parameter instrument after calibration of DO.

Salinity (PSU): The salinity from the multi-parameter instrument.

Redox (mv): The redox from the multi-parameter instrument; not calibrated or recorded for WQM projects

Date/Time Analyzed: The month, day, year and time the multiparameter instrument was used to collect data. The times for measurements collected at the same station cannot be the same for different P-numbers (e.g. depth profiles).

P/F: Pass (P) or **F**ail (F) must recorded by the analyst at the time the calibration or verification is performed.

Signature: Signature of the **Sample Analyst**.

Reviewed By: Signature of the person responsible for reviewing the field test report prior to laboratory submittal.

7.3.4 Field Sample Labels

Sample bottle labels are generated during LIMS pre-login, which produces a unique identifier for each sample bottle. For routine District samples, the label is color-coded by analyte or group of analytes and affixed to the sampling bottle. The label must contain the Project code, Station ID, Sample ID, Sample Type, Sample Preservation, ACODES (tests) Matrix, and Date and Time (Figure 5). When making changes to the label, any deletions must be struck through with a single line, then initialed and dated by the person making the change. For manual labeling, a project-assigned field number or a LIMS-assigned pre-login number must be used along with other unique identifying information on the label.

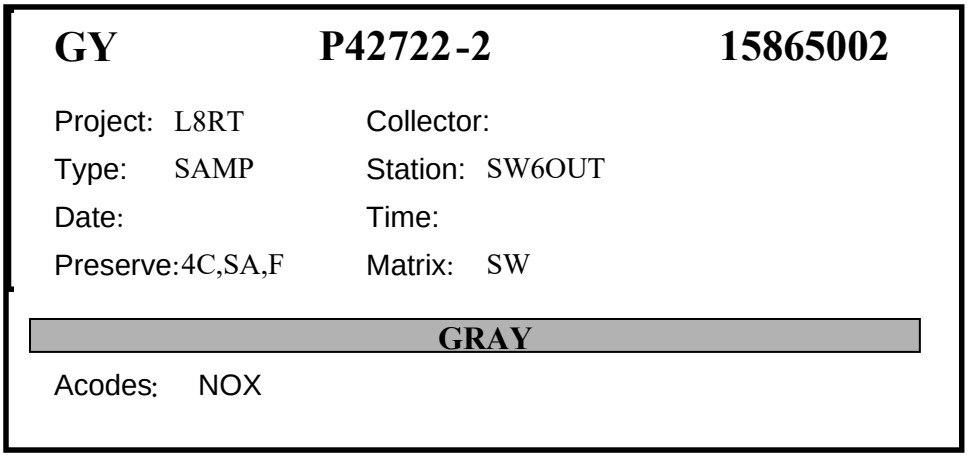


Figure 4. Pre-printed Sample Label Generated from LIMS (7.3.4.A)

7.3.5 Field Notes - General Instructions

Relevant field observations must be noted either electronically using the HFDM field computer or handwritten on a preprinted field note sheet. The field notes sheets in HFDM are generated from the entries made into the Notes section of the application and differ slightly from the preprinted field note sheets listed below.

The type of field note sheet used is based on the type of sampling. Four current types of sheets are:

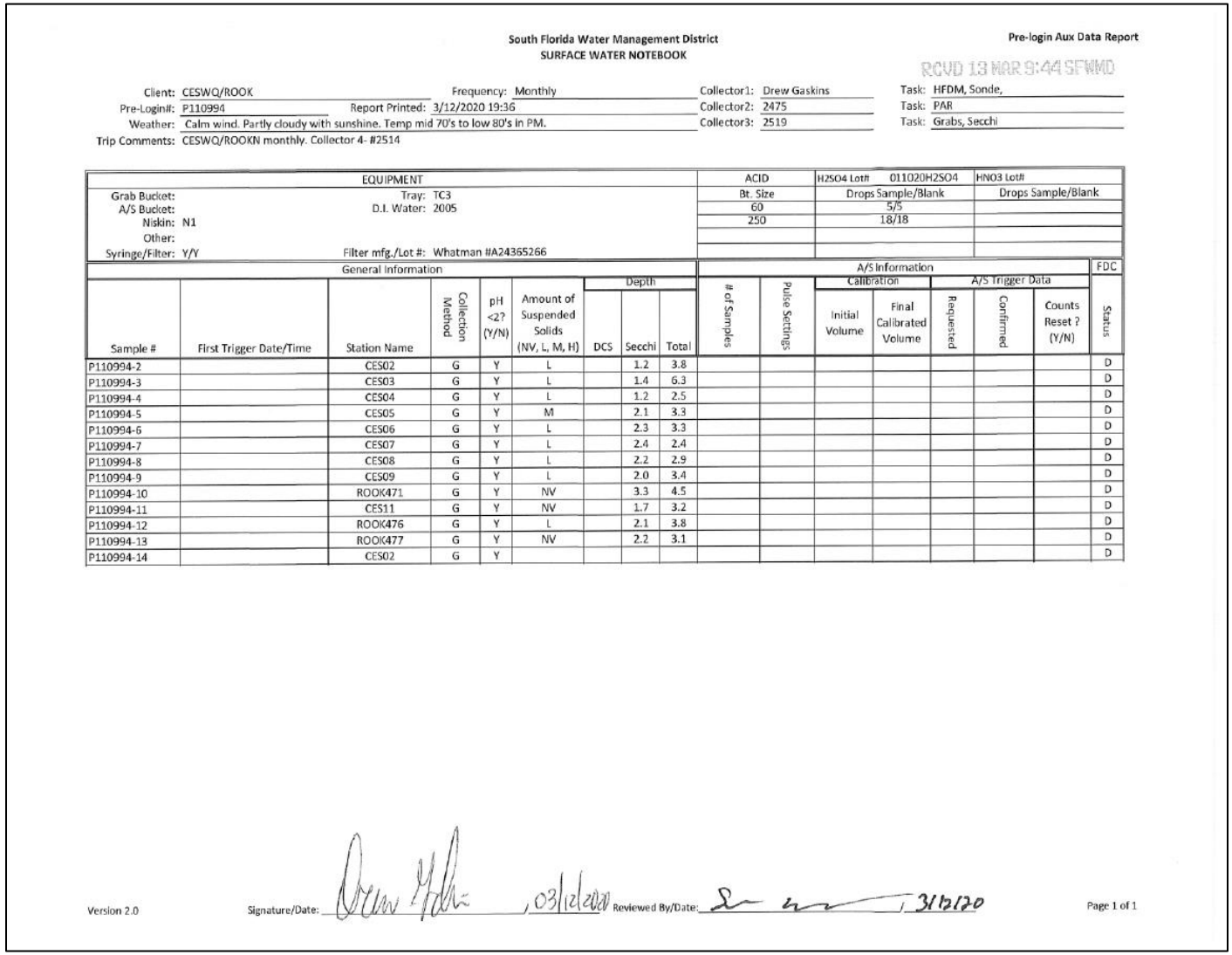
- Surface water sampling,
- Groundwater Sampling Purge Log (in FDEP SOP FS2200)
- Marsh sampling (in associated SOP) and
- Fish sampling (in associated SOP).

All entries ***must be*** made ***at the time of sample collection*** and not after leaving the collection site. Copies of recent field notes (at least five (5)) should be taken into the field as a reference during sampling events.

Field Notes must include information that may affect the quality of the sample or field parameters. General guidelines for observations include the following:

- Information documented must describe the sample, sampling activities and surrounding sampling conditions that might affect sample quality. Examples include:
    - All gates are open 1.0 ft.,
    - Construction is taking place 100 ft. upstream of the sampling station,
    - The sample has a very light amount of fine suspended solids with vegetative particulates,
    - Mary Smith, a Field Auditor, is riding along on the trip today to observe sampling techniques (visitors or persons other than sampling personnel on site such as fisherman, construction crew)
    - Ambient conditions (Station is choked with water hyacinth, ash fallout from crop burning, fish kill, etc.)
- Observations must be clearly documented such that end users will understand them.
- When transcribing comments from a paper form into HFDM for Laboratory Information Management System (LIMS) upload, the comments in HFDM **must duplicate** what was written on the paper form.
- DO NOT USE SPECIAL CHARACTERS including: ! @ # ^ ( ) & * " ' < > = -- (double dashes) Special formatting of text such as **Bold**, *italics*, underline and superscripts (e.g. 23^{o}F instead of 23F) must also not be used. The database accepts plain text only so these characters cause errors during loading. The exceptions are commas (,), colons (:) and periods (.). This is required in both HFDM and in handwritten records.
- Staff gauge readings documented in sample comments should be read to the accuracy the to which the gauge is calibrated (tenths or hundredths). Any rounded reading should be to the lower calibrated staff gauge value.
- If an autosampler sample is collected, a comment must be added to the corresponding P-number in HFDM to indicate that a second individual verified the autosampler program was restarted. The individual must be different than the sampling personnel that processed the sample and restarted the program (the only exception would be a trip with only one individual). Example comment**:** JD verified that the autosampler program was restarted, and the program is running.

All field documentation submitted must be accurate and complete. All non-HFDM field notes pages must be submitted with any unused portion of the page(s) struck-through with a single diagonal line. The strike-through must include the comment "no further entries" and be initialed and dated (month/day/year). When there is no sonde data on the FTR, the page(s) must be struck-through with a single diagonal line. If there are sonde OCS values on the FTR (e.g. LOWA IC/ICV), the strike-through must include the comment "no sonde used" and be initialed/dated (month/day/year). The OCS values are not cancelled or struck through. See Appendix I of the *HFDM* SOP (SFWMD-FIELD-SOP-018).



South Florida Water Management District
SURFACE WATER NOTEBOOK

Pre-login Aux Data Report

RCVD 13 MAR 9:44 SFWMD

Client: CESWQ/ROOK | Frequency: Monthly | Collector1: Drew Gaskins | Task: HFDM, Sonde,
Pre-Login#: P110994 | Report Printed: 3/12/2020 19:36 | Collector2: 2475 | Task: PAR
Weather: Calm wind. Partly cloudy with sunshine. Temp mid 70's to low 80's in PM. | Collector3: 2519 | Task: Grabs, Secchi
Trip Comments: CESWQ/ROOKN monthly. Collector 4- #2514

EQUIPMENT

Grab Bucket:
A/S Bucket:
Niskin: N1
Other:
Syringe/Filter: Y/Y
Tray: TC3
D.I. Water: 2005
Filter mfg./Lot #: Whatman #A24365266

ACID	H2SO4 Lot# 011020H2SO4	HNO3 Lot#
Bt. Size	Drops Sample/Blank	Drops Sample/Blank
60	5/5	
250	18/18	

General Information						Depth			A/S Information							FDC
											Calibration		A/S Trigger Data			
Sample #	First Trigger Date/Time	Station Name	Collection Method	pH <2? (Y/N)	Amount of Suspended Solids (NV, L, M, H)	DCS	Secchi	Total	# of Samples	Pulse Settings	Initial Volume	Final Calibrated Volume	Requested	Confirmed	Counts Reset ? (Y/N)	Status
P110994-2		CES02	G	Y	L		1.2	3.8								D
P110994-3		CES03	G	Y	L		1.4	6.3								D
P110994-4		CES04	G	Y	L		1.2	2.5								D
P110994-5		CES05	G	Y	M		2.1	3.3								D
P110994-6		CES06	G	Y	L		2.3	3.3								D
P110994-7		CES07	G	Y	L		2.4	2.4								D
P110994-8		CES08	G	Y	L		2.2	2.9								D
P110994-9		CES09	G	Y	L		2.0	3.4								D
P110994-10		ROOK471	G	Y	NV		3.3	4.5								D
P110994-11		CES11	G	Y	NV		1.7	3.2								D
P110994-12		ROOK476	G	Y	L		2.1	3.8								D
P110994-13		ROOK477	G	Y	NV		2.2	3.1								D
P110994-14		CES02	G	Y												D

Version 2.0

Signature/Date: Drew Gaskins, 03/12/2020 Reviewed By/Date: [signature], 3/13/20

Page 1 of 1

Figure 5. Example of an Electronically-Generated Surface Water Notebook Sheet (7.3.5.A)

7.3.5.1 Surface Water Notebook Entries

The electronically generated (from HFDM) / pre-printed surface water notebook sheet (Figure 6) must include the following information:

- **Client:** Name of the project (e.g. STA6).
- **Date:** Formatted as MM/DD/YY.
- **Pre-Login #:** The unique number generated by LIMS for a sampling trip.
- **Frequency/Trip Frequency:** The corresponding frequency of the grab samples taken during a sampling trip.
- **Collectors and Tasks:** The LIMS registered collector number(s) of the collector(s) sampling and the corresponding responsibilities for each collector (e.g. 123 - grabs, processing; 456 - hydrolab, notes)
- **Weather/Weather Observation:** The weather is noted at the first sampling station.
    - Items that are included are temperature, wind and sky conditions. Any changes in weather conditions that may potentially affect the quality of the sample shall be logged accordingly at the station and time they become apparent.
- **Trip Comment:** Comments that pertain to this sampling trip as a whole or for issues with the multi-parameter instrument (e.g. CCV failure).
- **Equipment**: The applicable equipment used with the unique identification/lot numbers.
    - Notes on whether different equipment/methods are used to collect samples at different stations (e.g. a Niskin is used at some stations, but samples are collected directly into the bottle at other stations).
    - Equipment recorded must include intermediate bottles used to collect sample that is later transferred into a sample bottle. These are recorded under "Other Id" and should be recorded as "2 liter bottle" or "1 liter bottle" as appropriate.
    - The manufacturer of the filters and lot number.
    - The AFW used for the sampling trip listed by carboy number.
- **Acid:** The type of acid(s) and the lot number(s) used for sample preservation for this sampling trip.
    - The amount of acid, measured in drops, added to each bottle type/size; acid amounts documented are representative of all samples and blanks collected on this day unless noted otherwise in the field notes for a specific station.

- **General Information/Sample Information:**
    - **Sample #/Sample ID:** The hyphenated suffix of the P-number
    - **First Trigger Date**: 24-hour format (e.g. 1430) time must correspond to the time on the sample label and COC. This is recorded at the time of sample collection.
    - **Station Name/Station**: The COC station code.
    - **Collection Method**: The one to three-letter code for the method of sample collection (e.g. G – Grab, ACF – Auto-Sampler Composite Flow Proportional).
    - **Amount of Suspended Solid/Suspended Solids:** Based on the visual observation of the sample that is collected. Valid codes are:
        - NV No Visible solids,
        - L Light visible solids,
        - M Moderate visible solids, or
        - H Heavy visible solids.
    - **pH < 2? (Y/N):** Record "Y" when:
        - The pH of the processed grab is < 2.
        - The pH of the processed/composited autosampler sample is < 2.
    - ***If additional acid was added*** to an ACT, ADT or ACF sample, it ***must be*** noted in the Notes section of the field notes for the sample (e.g. Comment: "Added 2 drops of H_2SO_4 to sample").
- **Depth (Electronically-Generated only)**
    - **DCS:** Not recorded, left blank
    - **Secchi:** Recorded Secchi depth reading in meters
    - **Total:** Total depth in meters
- **A/S Information**
    - **Number (#) of Samples:** The number of samples successfully collected by the autosampler into the discrete bottle or 5 gal jug.
    - **Pulse Settings/Pulse:** For ACF autosamplers, the number of pulses for which the autosampler is set.
    - **Initial Volume:** The volume of sample the autosampler collected during the first calibration check (e.g. 97 mL). *<u>For ADT samples only</u>, this is required only for the first P-number at that station to be documented.*
    - **Final Calibrated Volume/Final Volume**: The final volume of sample the autosampler collected after a calibration is performed ***if*** the initial volume was out of the calibration range (e.g. > or < 10mL from the 100 mL target volume); otherwise this field is left blank.

For ADT samples only, this is required only for the first P-number at that station to be documented.

- **Requested:** The number of requested samples the autosampler was triggered to collect, read from a MOSCAD or CR10, via RTU display, Telvent and ***not*** directly from the autosampler.
- **Confirmed:** The number of confirmed samples the autosampler was triggered to collect, read from a MOSCAD or CR10, via RTU display, Telvent or online autosampler report and ***not*** directly from the autosampler.
- **Counts Reset:**
  - Y Yes - the autosampler counts have been reset.
  - N No - the autosampler counts have not been reset.

- **FDC (Electronically-Generated only)**
  - **Status:** Will list "D" for "Done" or "C" for "Cancelled" when Surface Water Notebook is generated prior to relinquishing the trip file in HFDM.

- **Signature/Date:** The signature of the field sampling technician responsible for documentation and the date. This signifies the documentation has been reviewed by the signee and that the documentation is complete and accurate.

- **Reviewed by/Date:** The signature of the person responsible for reviewing the documentation and the date. This signifies the documentation has been reviewed by the signee and that the documentation is complete and accurate.

7.4 Documentation Correction Procedures

For corrections to be made to documentation, specific procedures must be followed and general factors must be taken into account as per *Correction of Field Records* (SFWMD-FIELD-SOP-032):

- Prior to submitting the samples to the laboratory, corrections can be made to the original COC, FTR and/or field notes by field sampling staff.
- After submitting the samples to the laboratory (i.e., the COC, FTR and field notes have passed through the laboratory login), a signed LIMS/DBHYDRO Water Quality Data Investigation and Correction Form with attached supporting documentation must be submitted to the WQM QA Team and approved by the WQM QA Team member before the correction is sent to the Laboratory so the correction can be made in LIMS or DBHYDRO.
  - The correction form must be attached to the supporting documentation along with a copy of the corrected COC, FTR and/or field notes marked "Corrected Copy" by Data Validation personnel. The copy of the COC, FTR and/or field notes must be printed from LIMS.

Other general factors for documentation correction are:

- A written correction must be struck through with a single line and dated (MM/DD/YYYY) and initialed by the person making the correction.
- Additions made to documentation are considered corrections and must adhere to the following established correction procedures.
- Corrections must be traceable. (i.e., if a field pH correction is requested, it must be based on an authentic copy or an original document (e.g. handwritten field notes). Field parameter log files that have been saved to the ProDSS folder in the WQM Data Dropbox (Z:\kb_wqm_Data_Dropbox\PRO DSS) and can be used as traceable supporting documentation if a field parameter requires correction.
- Corrections based on assumptions or recollections are **not** acceptable.
    - Information based on direct field observations (e.g. weather or sample depth) **cannot be corrected** after leaving the sampling station.
    - If additional information (e.g. stage data or gate settings / positions) that contradicts a direct field observation, the additional information should be added as a comment to the sample data by the FPM. However, the additional information cannot be used to change the field observation.
    - Information based on direct field observations (e.g. UD code or sample depth) may be corrected after leaving the sampling station only if additional information was documented at the time of the station visit on the COC in the sample comment field (e.g. station dry; gates closed; no flow at station). If this supporting information is not available, then a correction cannot be made.
    - Signatures to documentation cannot be corrected by backdating (i.e. signed and dated a previous date). Adding an initial and date to a backdated signature would be construed as "time warping" and is unethical. If a signature is not included on the documentation, it **must not be** added after the paperwork is submitted to the laboratory.
- Only information regarding samples submitted to the laboratory is reflected on a COC. Information pre-printed on a COC, but not related to samples submitted to the laboratory (e.g. sampling depth of 0.5 preprinted on the COC even when the sample is NOB) **must be** considered as correctable information and treated as such using the correction procedures outlined above.

7.5 Field Documentation Review

All science technicians are responsible for ensuring the accuracy and completeness of the COC, FTR, and field notes prior to submission to the laboratory. Additionally, FPMs are required to review field notes for comments that may indicate any sample quality concerns. Any quality concern with a sample or field data must be raised with the QAO. A FPM may request appropriate qualifier(s) or a Project Manager Remark (PMR) to be associated with the sample(s). These processes are described in the *Correction of Field Records* (SFWMD-FIELD-SOP-032).

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 WQM 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.

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

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

When collecting field QC it is important to mimic the sample collection process as closely as possible. 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 with RAIN sampling as the ONLY exception.

RAIN (Atmospheric Deposition Project) and surface water collection processes are adequately separate from the grab and autosampler samples collected on the same trip, **the RAIN EB is associated with the RAIN samples only**, and the other blank(s) collected with the surface water samples (grab and autosampler) are associated exclusively with those collection methods. RAIN EBs are not processed in the field, do not have the same handling and transport, processing environment, or the same preservation acid dropper bottle(s) as surface water samples; the only part of the blank assessment they have in common are the laboratory processes.

8.1 Field Quality Control Blanks

All QC blanks (Table 19) must be chemically preserved, stored, transported and analyzed with the collected field samples.. 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)

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 is improperly preserved and would then be qualified based on that improper preservation, the affected ACODES/tests are cancelled for that field QC blank. The associated sample ACODES /tests are then qualified with a PMR that states the sample analytical result is not associated with a field QC blank, and the ACODES need to be cancelled for the QC Blank. The following procedure should be followed:

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

- Each associated sample that contains these ACODES must then get a PMR, but just on those affected ACODES. For example, if the sample had gray, magenta and beige bottles, but only the magenta bottle was under acidified, the ACODES 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 do improper preservation".

- In a separate correction you would then cancel the ACODES associated with that bottle for the QC Blank.

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 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.

8.1.1 Equipment Blank (EB)

An Equipment Blank must be collected and processed before any sample is collected or processed 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.
- If possible, the station with the longest parameter list should be collected first to ensure the EB includes a full suite of parameters.
- 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 Section 7.3.2)

- 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 the sampling equipment is only 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.

8.1.1.1 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 Niskins or buckets.
- **For trips with autosamplers**, a single 1L autosampler discrete bottle must be included in the EB collection train. The bottle to be included in the EB is randomly selected from one of the bags of clean discrete bottles brought on the sampling trip. The selected discreet bottle is filled with one liter of AFW from the spigot of the Niskin, then the contents of the discrete bottle are emptied directly into the composite/autosampler bucket. The remaining volume of the Niskin can be emptied directly into the composite/autosampler bucket.
- For dissolved parameters, the filter must be rinsed with a minimum of 30 mL of water, and the rinsate from the filter is discarded prior to collection of the EB.
- The EB must be preserved according to each sample bottle label.

8.1.2 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 per sampling trip (i.e., each sampling day) where equipment cleaning is performed in the field at a sampling station after sample collection, between two or more stations or after the last station is sampled.
- 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
- 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.

8.1.2.1 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 equipment is 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 Niskins 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 filter must be rinsed with a minimum of 30 ml of rinsate AFW, and the rinsate from the filter is discarded prior to collection of the FCEB.
- The FCEB must be preserved according to the sample bottle label.

8.1.3 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 when there are obvious concerns of environmental contamination during sample collection or processing (e.g. construction dust, ash, etc.).

- FBs collected due to concerns for environmental contamination must be clearly identified in the field notes as to why the blank was collected and the conditions that existed.
- If the concern of contamination applies to more than one station, only one FB is required, but the stations associated with it must be documented in the field notes.
- FBs must be collected to match a list of all parameters sampled (usually via grab sample) for the project(s) associated with the sampling trip.

8.1.3.1 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), 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.

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 documentation. Excess acid preservation may interfere with laboratory analysis of the sample so the pH must not be less than pH 1.3 S.U.

8.1.4 Replicate Sample (RS)

A Replicate Sample is collected and analyzed to evaluate the precision of the sample collection and handling process, and environmental variability.

- 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 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, at the station and, if possible, with the longest parameter list. For trips where there is no one station that includes all analytes for the trip, the FPM must prioritize which analytes 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.
- 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 cancelled and not designated as 'NOB'.

8.1.4.1 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 swithching out gloves and rinsing of 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 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 documented in the same manner as routine samples.
- Field parameter data, if collected for the regular sample, must be collected for each RS collection.

8.1.5 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.

8.1.6 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 WQM

8.1.6.1 SS Collection Method:

- The sample collection procedure must be repeated until the sample composite bucket contains enough to process the sample and 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 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.

8.1.7 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.

8.1.8 ASEB for Tubing with Specific Lot Numbers

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

8.1.8.1 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 pumphead 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 Tygon® tubing that have identical lot numbers, an ASEB must be collected from a minimum length of 20 feet of the tubing.
- 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 mLs 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. If contamination is suspected (e.g. holes in the bag) another ASEB must be collected.
- Tubing must be stored in a manner consistent with any other piece of sample collection equipment. Storing tubing in sealed bags alleviates the need for another ASEB on that batch / lot of tubing.

8.1.8.2 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 Tygon® tubing",
    - "ASEB ISCO silicone pump tubing" or
    - "ASEB silicone distributor arm tubing" and
    - Must document the manufacturer and lot number(s) of the tubing.
- The P-number must be recorded/labeled on each roll per batch of Tygon® 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 WQM server

(\\ad.sfwmd.gov\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 documented in the Autosampler Maintenance and Problem Report when tubing from a particular lot is deployed.

8.1.8.3 ASEB Results Evaluation:

- EB results will be retrieved from LIMS by a QA Team member and this information will be posted on the WQM 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 Tubing or distributor arm tubing: A new piece of tubing must be tested from the same lot.
    - Roll of Tygon® tubing: A new section of 20 ft 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.

Table 19. Field Quality Control Checks and Requirements (8.1.A)

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 and the closest collection date/time.	Acceptance Criteria; <20% RSD for water sample, <35% RSD for soil sample. 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 and the closest collection date/time.	Acceptance Criteria; <20% RPD for water sample, <35% RPD for soil sample. 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%.

8.2 Data Qualifier Codes

If field and/or laboratory data need to be qualified the codes used are listed in Table 20.

Table 20. Data Qualifier Codes (8.2.A)

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.

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.

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 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 13 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.

ACF (Autosampler Composite Flow Proportional) Autosampler configured to collect periodic sample aliquots based on a flow calculated trigger. For refrigerated autosamplers, the aliquots are pumped into a single composite container and this processed into a single composite sample. Most autosamplers have 24 discrete, one-liter bottles into which the aliquots are pumped. The discrete bottles that are filled are composited into one container at the end of the collection period. In each case, the composite sample is processed into one or more subsamples for submission to the laboratory.

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

ACT (Autosampler Composite Time Proportional) Autosampler configured to collect a composite sample of sample aliquots based on a timed trigger.

ADT (Autosampler Discrete Time Proportional) Autosampler configured to collect periodic samples or sample aliquots based on a timed trigger. The sample aliquots are collected in discrete autosampler bottles that are then each processed into separate sample bottles to be submitted to the laboratory. A time-proportional autosampler collecting samples at three (3) hour intervals; aliquots are composited as daily samples (each bottle is processed as a discrete 24 hour time period (ADT) starting at 02:00 AM to avoid issues with daylight savings as set by the FPM following discussions with the data's end user(s). This strategy allows for daily characterization of the water quality canal system independent of flow events, while allowing water quality conditions during short-term flow events to be evaluated. This type of monitoring does not require flow calculations or flow monitoring equipment. Each week the autosampler is stopped to process the previous week's sample and is restarted to begin at 02:00 AM. This means that Day 7 is a shorter timespan than the other 7 days. The discrete bottles within each autosampler are pre-acidified and analyzed for TPO4.

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 free of all positive or negative analytical interferences in which all analytes of interest are below method detection limits.

ATF **(**Autosampler Composite Time Flow) This is a composited autosampler sample where the individual samples were collected on a timed basis, but only during flow (e.g. S80 used to be set up this way)

Audit A systematic, independent and documented 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.

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.

Blind sample A quality control sample of known composition whose analytical characteristics are unknown to an audited analyst or organization.

Blind replicates (or duplicates) are replicates that have been collected (field replicates) or prepared (laboratory replicates) and are analyzed as separate samples whose replicate nature remains unknown to the analyst or organization.

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

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.

Cancelled An action that the Results entry is cancelled

Chain of Custody (COC) Documentation that includes 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 does not contain all of the specifics for the implementation of the project. This information is in the operational monitoring plan.

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 Objectives A set of specifications established for an intended use of a set of data.

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

Deficiency finding in an audit that identified a process that does not meet on or more of the specifications of the QA references cited. Deficiencies result in either a Quality Improvement or Process Improvement.

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 set to 0.5 m. Used for grab samples.

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

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 WMD.

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 documentation, 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 procedures for field sampling and field data acquisition by WQM. The FSM may also be used by other organizations where the sampling procedures are 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 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.

Horizon Field Data Manager (HFDM) An application used to document 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, documents and protocols within the SFWMD.

Laboratory Information Management System (LIMS) 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 sampling event simulated in the field for new personnel being audited during the introductory period. The simulated sites may or may not be active and no samples from this event are relinquished to the laboratory.

Niskin A plastic cylinder with stoppers at each end in order 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. See Van Dorn

Operational Monitoring Plan – (OMP) A document that explains a project by defining the project organization, description, mandates and objectives. (See also Compliance Monitoring Plan)

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.

Periphytometer Artificial substrate of known surface area used for collection of algae (specifically periphyton) over a known amount of time.

Periphyton Aquatic algae attached to natural or artificial substrates.

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.

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

Processing (a.k.a. Sample Processing) The activities associated with taking a collected sample and separating the parent sample in to 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 WQM 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 WQM 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)

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.

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.

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

Sample Custody All records and documentation 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 Device 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.

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. This 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 Person responsible for collecting water quality and biological samples, documenting field sampling information, maintaining field records and documentation, and maintaining and tracking field equipment and supplies within the WQM at SFWMD.

Science Technician Supervisor (STS) 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 WQM 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 Site and Station Registration SOP.

Sonde A multi-parameter field instrument used to collect data for water quality monitoring projects. These are usually YSI, Hydrolab, Aqua Troll or Onset (HOBO) instruments.

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. Stations are registered according to the Site and 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 sample. The subsamples are processed differently depending on the specific analytical requirements.

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

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.

Take All (This refers to HFDM) A collection event that is available to be taken. An action that lets the authenticated user "Take ALL" samples associated with an event and assign them to the user.

Take Remaining (This refers to HFDM) Indicates some of the samples in the event have been assigned to a user. An action that lets the authenticated user "Take Remaining" samples associated with an event and assign them to the user. Do this ONLY if a partial event has been taken.

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. (a.k.a. Niskin)

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

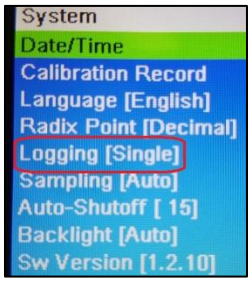
(ProDSS software version 1.1.8 or newer)

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

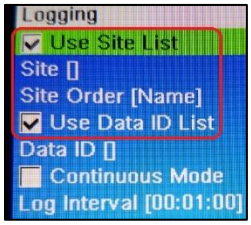
➔ *Set up the Site List one time on handheld, then only add P-numbers for future trips*

1. Press the 'System' button on the ProDss

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

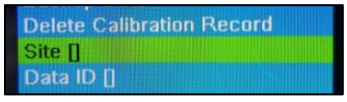


   b. From the Logging menu make sure that 'Use Site List' and 'Use Data ID List' boxes are checked. If they are not, scroll down and press 'Enter' to check the boxes.



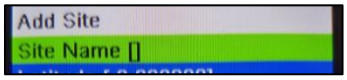
2. Press the 'File' button on the ProDss handheld.

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



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

c. From the Site Name [] menu select ‘Site Name []’

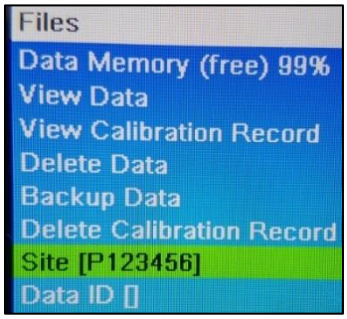


d. Type in your P-number with a capital ‘P’ (select ‘SHIFT’ to capitalize letters) and select ‘Enter’ when you are done.

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.



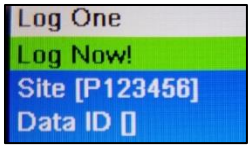
h. Press ‘Esc’ to return to the Home Screen.

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 ProDss handheld.

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



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.

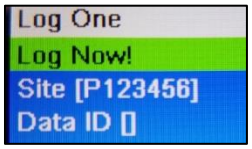
3. Press ‘Esc’ twice to return to the Home Screen.

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 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]’.

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.

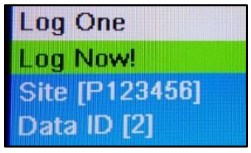
b. Check that the Data ID matches your dash number. *If the Data ID does not match your dash number:*

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.

2. Press ‘File’ on the 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.

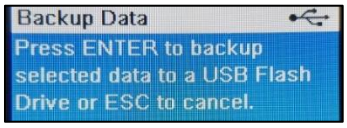
    a. Select ‘Site [<All Sites>]. Scroll down and select the correct P-number for your trip.

    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

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.”

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															

Appendix 4: 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 FSM - 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 by "sealed"
		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.

Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
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 by "representativeness". And clarified language on description of "non-representative samples".
		4.0.5	Added: Samples collected from "disconnected pools" 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 - 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
		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.).

Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
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 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".

Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
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
		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.

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.
		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	8/2020	Tables/Figures	Table and figure numbers Updated
		1.4	Added Section 1.4 Annual Review requirements.

Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
		1.5	Added References section.
11	8/2020	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.
		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.

Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
11	8/2020	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 120mL 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 stern as possible.
		4.2.2	Added to the beginning information regarding preservation of Acid storage in the field.
		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

Version	Date Issued (Month/Year)*	Section	Description of Edits/Changes
11	8/2020	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.
		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

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			have a diagonal line through it stating no field parameters collected. Unused Methods were removed from this glossary section
		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.
		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.