Field Sampling Quality Manual

SFWMD-FIELD-QM-001-08

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Prepared by

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Complies with F.A.C. 62-160 (FDEP's QA Rule)

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ACRONYMS

A

A/S – Autosampler
ACF – Autosampler Composite Flow
ACODES – Analysis Code
ACS – American Chemical Society
ACT – Autosampler Composite Time
ADT – Autosampler Discrete Time
ASEB - Autosampler Equipment Blank
ATF – Autosampler Composite Time Flow
AFW - Analyte Free Water

C

CCV- Continuing Calibration Verification
CH/DH- Clean Hands / Dirty Hands
COC – Chain of Custody
COND – Conductivity
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
DO – Dissolved Oxygen
DVS – Data Validation Section

E

EB – Equipment Blank
EMRP - Environmental Monitoring Review Process 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
FSQM- Field Sampling Quality Manual
FST – First Sample Trigger
FTR – Field Test Report

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
ICV-Initial Calibration Verification
ID -- Identification

K

KCl – Potassium Chloride

L

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

M

MOSCAD RTU –SCADA Remote Terminal Unit
MDL – Method Detection Limit

N

NA – Nitric Acid (preservation code)
NIST - National Institute of Standards and Technology

NOB-No Sample Bottle

P

PAR - Photo-synthetically Active Radiation
PSR – Pre-login Summary Report
PVC – Polyvinyl Chloride

Q

QA-Quality Assurance
QC – Quality Control
QAO- Quality Assurance Officer

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
SSID - Standard Set Identification number
SOB-Secchi On Bottom
SOP- Standard Operating Procedure
SS – Split Sample
STA- Stormwater Treatment Area
STS- Science Technician Supervisor

T

TD- Total Depth

U

USB – Universal Serial Bus
USEPA – United States Environmental Protection Agency

V

VOC- Volatile Organic Compound

W

WQB – Water Quality Bureau
WCA- Water Conservation Area
WQM- Water Quality Monitoring

SECTION 1:
STATEMENT OF POLICY

1.0 QUALITY COMMITMENT

The South Florida Water Management District (SFWMD) is committed to providing the highest quality data by supplying all necessary personnel and material resources needed to assure all monitoring data meet regulatory quality assurance standards and are defensible.

This Field Sampling Quality Manual (FSQM) defines the minimum 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, and biological samples and data collected by the District's Water Quality Monitoring Section (WQM).

This FSQM is intended to be used as a reference and training guide for SFWMD and on-site contracted personnel involved in the collection and submittal of samples for laboratory analysis and field testing. Adhering to the FSQM's protocols must be required of contractors performing work for the Water Quality Bureau (WQB) as required by contract.

1.1 ETHICAL EXPECTATIONS FOR FIELD SAMPLE COLLECTION AND TESTING CONDUCTED BY WATER QUALITTY MONITORING

All Water Quality Monitoring (WQM) sampling staff who perform field sampling, field testing, and/or data review must commit to following the requirements within the FSQM, field Standard Operating Procedures (SOPs), project-specific requirements found in the project's monitoring plan, and/or other management-directed instructions to assure collected samples are of acceptable quality 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 employee will be required to sign the Ethics and Data Integrity Agreement asserting they will maintain the level of ethics required by the SFWMD. SFWMD employees 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 or the FSQM without prior approval from a Science Technician Supervisor, Field Project Manager (FPM), and/or a member of the WQM Quality Assurance (QA) team and without any notation in the sampling field notes; exempted are cases when deviation is

necessary for health and/or safety. WQM sampling staff must document exemptions in the field notes and/or pre-login summary report (PSR).

- 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 District 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 U.S. Environmental Protection Agency (USEPA).

1.2 ETHICS AND DATA INTEGRITY AGREEMENT

1. I, _____ (Print full Name) state that I understand the high standards of integrity required of me with regard to the duties I perform, the samples I collect and the data I report in connection with my employment at the SFWMD.

2. I agree that in the performance of my duties in the WQM Section:

    a. I shall not intentionally falsify data nor report fraudulent data;

    b. I shall not intentionally falsify field documentation nor knowingly omit required documentation;

    c. I shall not intentionally report dates and times of data and/or sample collection and processing activities that are not the actual dates and times of the activity; and

    d. I shall not intentionally represent another individual's work as my own.

3. I agree to inform my supervisor and/or other SFWMD management personnel of any deviations from standard protocols, accidental reporting of non-authentic data, false or erroneous documentation by a District employee including myself, in a timely manner upon their discovery.

4. I acknowledge having been trained and informed regarding the performance and ethical expectations expected by the WQM Section of the SFWMD and agree to follow the protocols, procedures, and methodologies detailed in the FSQM, SOPs, project-specific monitoring plans, and/or other instructions to assure samples and/or data collected are of acceptable quality and to be defensible.

Signature: _____ Date: _____

Trained by: _____ Date: _____

SECTION 2:

ORGANIZATIONAL STRUCTURE AND KEY RESPONSIBILITIES

2.0 ORGANIZATION AND RESPONSIBILITY

Table 2.0.A Key Personnel Involved With the Collection of Samples

2.0 ORGANIZATION AND RESPONSIBILITY

Key personnel responsible for overseeing the collection and analysis of samples are listed in Table 2.0.A.

Table 2.0.A Key Personnel Involved With the Collection of Samples

Position	Relevant Responsibilities
Water Resources Division; Water Quality Bureau	
Division Director and Bureau Chief	Responsible for allocating resources throughout the Division and Bureau to meet the needs of the District for sampling, analytical services, and the quality systems program.
QA Administrator	Responsible for overseeing the overall Water Quality Bureau QA program, initiating and coordinating relevant training, performing project and process audits, and arbitrating data quality and methodological issues.
Water Quality Monitoring Section	
Section Administrator	Responsible for allocating Section resources, ensuring that all monitoring requirements are met and samples/data are collected in accordance with applicable mandates, SOPs, etc.
Section Lead	Responsible for managing a Project Management Unit, including hiring professional and technical personnel, budgeting and resource allocation within the Unit, designing sampling networks, and overseeing the development and management of contracts and projects. Provides oversight for Field Operations Sampling and Logistics Units.
Project Manager	Responsible for managing projects, developing and tracking project budgets, developing monitoring programs and associated plans, reviewing field data, and providing technical guidance to field staff and other District personnel.
Contract Manager	Responsible for managing individual contracts and projects, developing and tracking project budgets, developing monitoring programs and associated plans, reviewing field data, and providing technical guidance to field staff and other District personnel.
Science Technician Supervisor	Responsible for managing a Field Operations Sampling and Logistics unit, hiring and training of personnel in sampling and adhering to QA procedures, scheduling and organizing field trips, ensuring samples are collected following proper protocols, purchasing of field sampling supplies and maintaining field equipment.
Science Technicians	Responsible for collecting water quality and biological data and/or samples, maintaining field records and documentation, maintaining, programming, deploying, and tracking field equipment and maintaining an inventory of required supplies.
QA Officer (QAO)	Responsible for managing the WQM field quality systems program, coordinating with the QA administrator to set QA/QC protocols for field services, overseeing field audit program, maintaining the FSQM and interpreting WQM field QA/QC criteria. Coordinates resolution of issues concerning field activity requirements with FDEP QA personnel.
WQM QA Team	Responsible for implementation of the WQM Section's field quality systems program, implementing the field audit program, coordinating annual review/revision of SOPs, annual review/revision of the FSQM and interpreting WQM field QA/QC criteria. Addresses QA customer service issues, reviews field data for QA/QC compliance, performs QA related investigations and asset control. The WQM QA team is under the responsibility of a Section Lead.

SECTION 3:

SAMPLING CAPABILITIES

3.0 WATER QUALITY MONITORING CAPABILITIES

The 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 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.

3.1 SAMPLING CAPABILITIES

The WQM sampling capabilities, listed in Table 3.1.A, 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).

Table 3.1.A Sampling Capabilities by Major Category

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	
Physical Properties	X	X		X	X
Organics	X	X			
Organic Compounds			X		X
Extractable Organic Compounds	X	X			
Volatile Organic Compounds (VOCs)*	X	X	X		
Microbiology	X	X			
Chlorophyll	X				
Radionuclides	X	X			

*****Includes low-level VOC collection following USEPA 5035 and FDEP QAS #98-03 guidelines.

3.2 FIELD EQUIPMENT

Tables 3.2.A through 3.2.F list the instrumentation, equipment, and supplies used in the collection of surface water sampling.

Table 3.2.A Surface Water Quality Sampling Equipment

Category	Equipment Description	Type of Material	Use	Notes
Grab sampling	Horizontal sampling bottle: Niskin, VanDorn or equivalent	PVC, polycarbonate, or QAO approved material	Collection	1, 3
	Dipper Wand	QAO approved material	Collection	1
	Plastic bucket	Polyethylene, white	Collection	1
	Filter holders	Acrylic/polypropylene or Teflon	Filtration	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	Silicon	Collection	1
	Sample bottles	plastic HDPE, Nalgene	Collection, sample transport and storage	
Auto-sampler	ISCO autosampler	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	Silicon/Tygon	Collection	
	Tubing Intake Strainer	Teflon/Stainless Steel	Collection	

NOTES:

1. Not suitable for collection of organics, extractable organics and VOCs.
2. Does not contact sample.
3. Horizontal bottles constructed of PVC ***must be*** used when collecting chlorophyll samples.

Table 3.2.B In situ Field Measurement Instrumentation

MULTIPARAMETER INSTRUMENT	OTHER FIELD MEASURING EQUIPMENT
YSI (6-Series)	Turbidity Meter
HYDROLAB (DataSonde 4, MiniSonde and 5- Series)	Secchi Disk
In-Situ Aqua Troll 200	LI-COR LI-1400 Datalogger and LI-93 Spherical UW PAR Sensor
	Depth Measurement Pole for Marsh Sampling

Table 3.2.C Sample Containers

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, 125 ml	Microcystin

Table 3.2.D Sample Preservation Supplies

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

Table 3.2.E Calibration and Maintenance Kit for Multi-parameter Instrument

Item Category	Description
pH calibration supplies	The range of pH buffers that bracket the expected range of values of the sites on the sampling trip (pH buffers - 7, 4 and/or 10).
Specific conductance calibration supplies	The range of standards that bracket the expected range of values of the sites 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 3.2.F Other Field Supplies

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

Equipment Description	Application
Disposable latex, PVC, or nitrile gloves, powder free *	Sample contamination prevention and protection of collector from sample preservative, ambient environmental conditions, etc.
Polyethylene trays or fiberglass trays	Provides clean working areas
Measurement PVC Pole	Measuring depth in a water body
Self adhesive sample labels	Labeling
Waterproof pens	Field documentation, labeling
Analyte-free water (AFW)	QC (e.g. Field blanks) and equipment rinsing
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 notebook	Field notes
Graduated Cylinder	Autosampler calibration check
Safety glasses	Eye protection during acid preservation of samples
Project location maps	Station location
WMD low band radio, cell phone	Communication
Digital camera	Station documentation
Global Positioning Systems	Station location

*****PVC not for organics

3.3 PREVENTIVE MAINTENANCE

All instruments and equipments ***must be*** maintained as suggested in the manufacturer's maintenance guide (see Tables 3.3.A and 3.3.B for minimum maintenance schedules).

The following ***must be documented*** on the maintenance form for each piece of sampling equipment listed in Tables 3.3.A and 3.3.B:

- 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, and
- Descriptions of any malfunctions necessitating repair or service.

Additionally, all vendor service records must be maintained.

Table 3.3.A Autosampler Required Maintenance Schedule*

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
	Autosampler bottles 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

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

Table 3.3.B Multi-Parameter Instrument Maintenance Schedule

Instrument	Specific Activity	Frequency
Hydrolabs (all models)[1]	DO probe membrane and electrolyte changed	Monthly[2] / as needed
	LDO 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 Multiprobe Instruments[1]	pH/redox combination probe cleaned with isopropanol soaked cotton swab and rinsed 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
	LDO 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 200	Conductivity probe cleaned with dilute Liquinox and soft brush, rinsed thoroughly 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.

SECTION 4:

DECONTAMINATION PROCEDURES

4.0 DECONTAMINATION PROCEDURES

Decontamination or cleaning procedures are based on the FDEP's SOP FC1000 (DEP-QA-001/01). This specifically requires all equipment in the sampling train to be transported to the field pre-cleaned and ready to use. Equipment surfaces that come into contact with the sample must be protected from exposure to substances and/or surfaces that may contaminate the sample (e.g. by utilizing a clean tray as a work area for sample processing on top of a truck tailgate).

4.1 ANALYTE-FREE WATER (AFW) AND AFW CONTAINER CLEANING

Analyte-Free Water (AFW) must be obtained from a laboratory that has a QA/QC approved water purification system. Field personnel must use AFW to prepare blanks and to rinse sampling equipment during the cleaning process.

AFW may be stored 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. AFW carboys obtained from the District laboratory are usually cleaned and filled by laboratory staff. AFW carboys must be returned to the District Laboratory.

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 identification number,
2. The date cleaned and filled with the laboratory technician's initials and
3. The check-out date with the field technician's initials.

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 must be rinsed after each sampling day with AFW five (5) times and cleaned at least once a week using the standard equipment cleaning procedures, omitting the acid rinse. Cleaning AFW containers using this method must be documented in the Equipment Cleaning logbook.

4.2 CLEANING FIELD SAMPLING EQUIPMENT

4.2.1 General Equipment Cleaning Procedure for Surface Water Sampling

Sampling equipment must be cleaned at the base of operations (e.g. the District laboratory 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. Unless constructed of stainless steel, all equipment must be thoroughly rinsed (all surfaces wet) with 10% hydrochloric acid.
5. All equipment surfaces must be rinsed three (3) times with AFW using enough water to ensure that all equipment surfaces are thoroughly clean.
6. The equipment must be air dried in a clean, designated equipment drying area.
7. The equipment ID must be recorded into the equipment cleaning logbook.

4.2.2 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 specific ID number of the piece of equipment cleaned (a unique identifier must be either etched or written with a permanent waterproof marker or a waterproof label on the equipment) and
- The date and initials of the person performing the cleaning.

The procedure used for cleaning equipment either must be documented and/or cited on each page of the Equipment Cleaning logbook.

4.3 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, placed in a clean plastic bag and sealed.

4.4 GROUNDWATER EQUIPMENT CLEANING

Equipment used to collect groundwater samples must be cleaned according to the protocols specified in the FDEP SOP (Section FS2200).

4.5 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, Sediment and Fish SOP* (SFWMD-FIELD-SOP-011).

4.6 SAMPLE BOTTLES (Reusable and Disposable)

Lab personnel wash, dry and test reusable sample bottles (e.g. autosampler discrete bottles and 2L sample bottles). They are washed with a laboratory grade, phosphorous-free detergent (e.g. Liquinox), rinsed with tap water, followed by a 10% hydrochloric acid rinse and then rinsed with AFW. After this procedure, the sample bottles must air dry completely. Each batch of clean re-usable sample bottles must be tested for cleanliness by the laboratory.

Disposable, certified pre-cleaned bottles are also used. Bottles for the collection of trace metal analyses other than mercury must be certified pre-cleaned for metals collection from the vendor.

4.7 ICE CHESTS AND SHIPPING CONTAINERS

The interior of the ice chest must be rinsed with tap water after use and washed with phosphate-free laboratory detergent (Liquinox) and rinsed with tap water if it becomes heavily soiled. 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.

Ice chests 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.

SECTION 5:

GRAB SAMPLING PROTOCOL

5.0 GENERAL CONSIDERATIONS

When conducting sample collections, a Science Technician (sampling personnel) must have available all of the following that apply:

- An electronic copy (QA USB) of the current FSQM,
- All relevant current SOPs,
- The project's current Monitoring Plan(s) and
- Project-specific information listing sampling station locations and sample collection information (e.g. "trip book").

5.0.1 Sampling Station Location

Sampling station locations (Geodetic position and descriptions) are listed in the project's operational monitoring plans**.** Station**s** are geo-referenced with a differential GPS with sub-meter horizontal accuracy. Stations are registered according to the SOP for *Establishing and Verifying Water Quality Station Coordinates* (SFWMD-QS-SOP-009).

Samples and field parameters must be collected at the registered locations unless a valid justification (e.g. vegetation, safety, etc.) for sampling at another location is noted in the field notes and on the Pre-login Summary Report (PSR). 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.

5.0.2 Contamination Prevention

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

- Samples must be protected from environmental contamination at all times.
- If water quality conditions are known in advance, samples must be collected from the sampling locations with the lowest concentration of analytes to those with the highest concentration of analytes (e.g. STA outflow sites are collected prior to STA inflow sites).
- Samples must be processed into sample bottles on a surface that is included in the field cleaning process (e.g. tray).

5.0.3 Protective Gloves

Protective gloves are required to be worn for all sample collection, 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.

Gloves must

- Be clean, new, un-powdered and disposable latex, vinyl, nitrile or PVC gloves (alternative glove materials must be approved by the QAO prior to use),

- Not come into contact with the sample, the interior of the sampling equipment, the sample composite container (e.g. bucket) or the sample bottle,
- Be changed
    - After collecting all the samples at a single sampling station and
    - If torn or used to handle extremely dirty or highly contaminated equipment.

5.0.4 Sampling Depth

Sampling depth is defined as the depth a 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 operational monitoring plan and/or SOP.

5.0.4.1 Surface Water Grab Sampling Depth and Total Depth

- Measuring Total Depth (TD) for marsh sample collection is specified in the *Surface Water Quality Sampling in Marshes SOP* (SFWMD-FIELD-SOP-004).
- TD is the depth to the bottom of the water body or column being sampled.
- Depth measurements for surface water collection are recorded in meters (unless otherwise specified in the SOP or project-specific monitoring plan).
- Grab sampling equipment must be marked with depth increments to aid in recording an accurate sampling depth. The sampling depth must be recorded for all grab samples.
- Ideally, 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 operational monitoring plan.
- If TD is $\geq$ 0.10 m and $\leq$ 0.20 m, the sample must be collected directly into a 60ml sample bottle at half the TD.
- Samples must not be collected when the TD is less than 0.10 m.
    - However, certain project-specific operational monitoring plan may specify that samples may be collected at depths less than 0.10 m because samples from the specified stations cannot be collected any other way (e.g. LOWA). In these cases the sample collection depths and procedures are specified in the operational monitoring plan.
- When collecting from a boat, TD must be determined prior to the sample collection or the multi-parameter instrument profile measurement.
- Field parameters (multi-parameter instrument readings) must be measured at the sampling depth (unless otherwise specified in the SOP or project-specific operational monitoring plan). The instrument must not touch the bottom.

5.0.5 When Not to Collect a Grab Sample

Samples must only be collected when they are representative of the water body of interest. Representative samples are those that are deemed part of the bulk water flow or contiguous with the main water body being sampled.

Non-representative grab sample areas 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 have no observable sheet flow 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.

The collection of non-representative samples as directed by a 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.

5.0.6 Grab Sample Rejection Criteria

Science Technicians are responsible for visually inspecting and accepting/rejecting the collected sample (Table 5.0.A). If an initial grab sample is deemed "unacceptable," 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 STS and/or FPM.

- Documentation must be complete and clearly explain the reason for rejecting any sample.
- Documentation that directly affects the quality of a sample and/or field data must be noted in the Field Notes and in the comment section of the PSR for the affected sample. (If digital images are taken, the photos should be sent to the FPM and noted in the comments.)

Table 5.0.A Grab Sample Rejection Criteria

Collection Type	Observation(s)	Field Action
Grab	Presence of insect(s) or other organisms.	Field personnel must discard and recollect.
	Presence of vegetation particulates	Field personnel must make a determination of 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 or particulates in a sample may be representative of some areas and/or typical for some projects. Field personnel must make a determination of whether a sample is representative and document the observed condition in the field notes.

5.1 GRAB SAMPLE COLLECTION PROCEDURES

A surface water sample:

- Must be collected by a Van Dorn water sampler (i.e., Niskin), dipper wand, intermediate bottle or sample bottle,
- Should not be collected in areas where vegetation impacts the collection of a sample,
- Must be collected upstream from the Science Technician (sample personnel) and
- Must be collected at the same sampling station near the autosampler when possible.
- The Science Technician (sampling personnel) should adopt behavior that limits the disturbance of sediments as they traverse the marsh to the sampling area and as 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. Sampling personnel must adopt behavior that limits the disturbance of sediments if they traverse a marsh to the sampling area and as they collect a sample.

- If no upstream location is available, the STS and/or the FPM must be notified for direction.
- If vegetation is mechanically removed to allow access to the water, a minimum of one (1) hour must pass before an attempt is made to collect a sample.
- If directed to collect a sample, the sample collection authorization and activities must be documented in the field notes and in the comment section of the PSR.
- ***The WQM QA team must be notified.***

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 either filtered or unfiltered sample water (before the bottle is filled with a sample and capped).
    - The sample bottle ***must not*** be rinsed when collecting samples for extractable or non-extractable organics.

5.1.1 Direct Grab Sampling

If the sample bottle is used to collect the sample directly, it is considered a "direct grab sample" or "intermediate" container (e.g. a 1L or 2L bottle). 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 slowly submerged, neck opening first into the water to the appropriate sampling depth.
- The bottle is inverted (turned upright) so that the water may flow into the opening, directing the opening towards the direction of water flow (if applicable). Water should be allowed to slowly flow into the bottle.
- The filled bottle should be quickly returned to the surface and the sample bottle capped.

- "Dipper Wands" are sometimes used for the collection of samples directly into a sample bottle (e.g.125 ml bottle).
    - A dipper wand consists of a pole with a fixture at the end that allows the attachment of a sample bottle. The wand ***must have*** a sample depth indicator attached to ensure that 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 sample bottle at the end of the dipper wand must be inserted into the water with the bottle neck opening first. The bottle must be lowered to the proper sampling depth determined by the sample depth indicator and the bottle turned upright (inverted) allowing the bottle to slowly fill.
- The filled bottle should be quickly returned to the surface and the sample bottle capped.

5.1.2 Grab Sampling from a Boat

- If a boat is used, the sample must be taken from the bow (i.e., away from the bilge pump outlets and engine exhaust) and upwind of the motor.

5.1.3 Grab Sampling with an Autosampler Peristaltic Pump

- Grab samples may be collected with a peristaltic pump if allowed or required by the project protocols.
- TPO_4, TKN and NOx are the only analytes for which samples can be collected in this manner, since the autosampler tubing has passed an Autosampler Equipment Blank (ASEB) for these parameters.
- When directed by either a STS or FPM to use an autosampler's peristaltic pump to collect a grab sample, it must be documented in the field notes and the PSR.
  - This sampling method should not be used unless a representative sample cannot be obtained any other way. Examples of this include when a station is covered with thick vegetation and it is not possible to collect a sample from upstream of the sample location or if safety is a concern at the station.
  - Care must be taken to **not purge** the tubing as the air bubbles may disturb the sediment or vegetation prior to collecting the sample.
  - The tubing must be rinsed with a sufficient volume of water prior to collecting the sample.
  - ***The WQM QA team must be notified.***

5.2 GRAB SAMPLE PROCESSING

- To reduce the possibility of contamination, samples must be processed on a clean surface such as a sampling tray, plastic bag or plastic sheet.
- Only one set of sample bottles labeled with the same pre-login number are allowed on the processing surface at any time.
- To ensure sample homogeneity, all composite samples must be mixed (i.e., by agitating the bucket or Niskin) before each sample bottle is filled.

5.2.1 Sample Filtration

- Filters (0.45 µm) must be stored by lot number in a sealed, plastic container at all times.

- A new, unused filter must be used for each sampling set and not be reused after processing each sampling set.
- Unfiltered samples must be processed before filtered samples.
- Samples requiring filtration are collected with a surface water collection device (e.g. Niskin, 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 mLs of the sample water or AFW and the rinsate discarded ***prior to*** filling the corresponding labeled sample bottle.
- 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 mls of the sample water or AFW prior to collection of the respective filtered samples and/or filtered blanks.

5.2.2 Acid Preservation

Samples must be preserved in the field within 15 minutes of sample collection with the exception of those not processed 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.
- Bottles containing the preservation acids H_2SO_4 and HNO_3 must be kept in separate, closed, dedicated and labeled containers.
- Acid dropper bottles must be dated and initialed by sampling personnel when first opened.
- H_2SO_4 and HNO_3 acid dropper bottles must be discarded within one month (30 calendar days) from the date when they were opened.
- The 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 5.0.B.

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 into a cooler in ice.
2. All H_2SO_4 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 should ***never be inserted*** into the sample bottle.

b. 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.

3. Each H_2SO_4 preserved bottle is capped and placed into a cooler in ice.
4. All HNO_3 preserved bottles must be acidified and each checked for proper pH (2a and b above).
5. Each HNO_3 preserved bottle is capped and placed into a cooler in ice.

All blank samples must be preserved with the <u>greatest</u> amount of acid that was required in the associated sample set and this amount documented in the field notes. Excess acid preservation may interfere with laboratory analysis of the sample.

5.2.3 Thermal Preservation

- Samples that require thermal preservation must be placed in ice within 15 minutes of collection.
- Enough ice must be used to immerse sample containers to a depth of at least half the container height to cool the samples as quickly as possible; if samples must be kept in a cooler overnight, they must be kept in ice and delivered to the laboratory within the holding times of the analytes collected.
- Samples collected by off-site sampling groups may also be stored in a refrigerator overnight and shipped to the lab the following day.
    - Samples stored in a refrigerator prior to shipping must be maintained at a temperature > 0 ^{o}C and $\leq$ 6 ^{o}C. (Water samples must not be allowed to freeze.)
    - The temperature for any refrigerator must be documented with a NIST traceable thermometer each working day during the period that samples are stored.
    - If a NIST traceable thermometer is not available the refrigerator must not be used.
    - NIST traceable thermometers used in refrigerators must be certified or replaced annually.
- Ice chests used for the transport of samples must not be used to store items other than environmental samples.

5.2.4 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 Analyte Free Water (AFW) immediately after use at each station, placing it in a clean plastic bag and sealing the bag.

5.3 SAMPLE TRANSPORT TO THE LABORATORY

- Samples must be delivered to the District/Contract laboratory within the holding times of analytes.
- Samples hand-delivered to the District laboratory must be placed in the sample receiving area or in a designated refrigerator.
- The Pre-login Summary Report (PSR), Field Test Report (FTR) and a photocopy of the field notes must be signed, time-stamped on each page and placed on the sample receiving desk (e.g. clipboard).
- When shipping, ice must be placed in a large plastic bag (double-bagged) with the samples and the temperature blank immersed in the ice. The bags must be sealed tightly to prevent leakage.
    - The original PSR must be in a clear plastic re-sealable bag, positioned on top of the samples in the cooler. Because most laboratories do not analyze samples during the weekend, samples are usually shipped Monday through Thursday.
    - A custody-seal must be visibly affixed over the lid of the cooler which must be completely sealed with shipping tape to ensure it does not open during transport.
    - The contract manager or his/her backup at the laboratory receiving the samples must be notified prior to shipment. Notification must include the shipment's tracking number if applicable.

5.4 SEDIMENT SAMPLE COLLECTION

5.4.1 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 another 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, triggered to collect sediment, then slowly retrieved to the surface where it is emptied into a stainless steel bowl/tray for processing.

5.4.2 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. *Mercury Sampling in Sediment SOP* (SFWMD-FIELD-SOP-007) *and Sediment Coring SOP* (SFWMD-FIELD-017)) to identify and review the desired methodology.

5.5 GROUNDWATER SAMPLE COLLECTION

Groundwater samples collected for District projects must be collected according to the protocols specified in the FDEP SOP Section FS2200. Bailers or bailing type sampling devices must not be used for purging or sampling groundwater wells for WQM projects.

5.6 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:

- *Mercury Sample Archiving* (SFWMD-FIELD-SOP-005)
- *Mercury in Fish* (SFWMD-FIELD-SOP-006)
- *Mercury in Birds* (SFWMD-FIELD-SOP-010)
- *Pesticides in Surface Water, Sediment and Fish* (SFWMD-FIELD-SOP-011)
- *Blue–Green Algae Observation* (SFWMD-FIELD-SOP-019)
- *Line Intercept Macrophyte Survey* (SFWMD-FIELD-SOP-024)
- *Taxonomic and Nutrient Periphyton Collection* (SFWMD-FIELD-SOP-025)

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.

5.7 MICROBIOLOGICAL SAMPLE COLLECTION

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

5.8 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 in Surface Water SOP* (SFWMD-FIELD-SOP-008).

5.9 MARSH SAMPLING BY HELICOPTER

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). For EVPA project sample collection in Water Conservation Area 1 (WCA1), the EVPA WCA1 monitoring plan must be referenced. Sediment samples collected from a marsh environment must be collected in accordance with Section 5.4 of the FSQM.

Table 5.0.B Holding Time and Preservation for Water Inorganics[1]

Bottle Label Color	Analyte	Preservative	Preservation Code[8]	Container Size (mL)/ Material	Holding Time
Beige (BE)	Lab pH (LPH)	> 0 °C & ≤ 6 °C	4C	250 ≤ 3 analytes; 500 > 3 analytes; Plastic	Immediate
	Lab Specific Conductance (LCOND)	> 0 °C & ≤ 6 °C	4C		28 Days
	Turbidity (TURB)	> 0 °C & ≤ 6 °C	4C		48 Hours
	Alkalinity (ALKA)	> 0 °C & ≤ 6 °C	4C		14 Days
	Alkaline Phosphatase Activity (APA)	> 0 °C & ≤ 6 °C	4C		24 Hours[3]
	Total Dissolved Solids (TDS)	> 0 °C & ≤ 6 °C	4C		7 Days
White (W)	Total Suspended Solids (TSS)	> 0 °C &≤ 6 °C	4C	1000; Plastic	7 Days
	Volatile Suspended Solids (VSS)				
Orange	Color (COLOR)	Field Filter; > 0 °C & ≤ 6 °C	4C, F	125; Plastic 60; Plastic[4]	48 Hours
	Ortho-Phosphate (OPO4)	Field Filter; > 0 °C & ≤ 6 °C	4C, F		48 Hours
	Nitrites (NO2)	Field Filter; > 0 °C & ≤ 6 °C	4C, F		48 Hours
	Chlorides[2] (CL)	None; Field Filter	F		28 Days
	Sulfates (SO4)	Field Filter; > 0 °C & ≤ 6 °C	4C, F		28 Days
	Silica (SIO2)	Field Filter; > 0 °C & ≤ 6 °C	4C, F		28 Days
Yellow	Carotenoids (CARO)	> 0 °C & ≤ 6 °C	4C, D	1000; Opaque (dark) Plastic	Filter within 48 Hours, 21 Days[5]
	Chlorophylls (CHL-N)		4C, D		
	Pheophytin (PHEO)		4C, D		
Magenta	Total Kjeldhal Nitrogen (TKN)	> 0 °C & ≤ 6 °C; Sulfuric Acid to 1.3< pH < 2	4C, SA	60 - 1 analyte[10], 125 –1 or 2 analytes, 250 – 3 analytes; Plastic	28 Days
	Total Phosphorus (TPO4)				
	Total Organic Carbon (TOC)				
Light Blue	Dissolved Phosphorus (TDPO4)	Field Filter; Sulfuric Acid to 1.3< pH < 2; > 0 °C & ≤ 6 °C	4C, SA, F	125 - 1 analyte, 125 – 2 analytes, 250 – 3 analytes; Plastic	28 Days
	Dissolved TKN (TDKN)				
	Dissolved Organic Carbon (DOC)				

Bottle Label Color	Analyte		Preservative	Preservation Code[8]	Container Size (mL)/ Material	Holding Time
Gray	Nitrate-Nitrite (NOX)		Field Filter; Sulfuric Acid; 1.3< pH < 2, > 0 °C & ≤ 6 °C	4C, SA, F	60; Plastic	28 Days
	Ammonia (NH4)					
Bright Blue (Total Metals)	Aluminum (TOTAL)	Manganese (TOTMN)	Nitric Acid to 1.3< pH < 2[7]	NA	250; Nalgene Plastic	6 Months
	Arsenic (TOTAS)	Nickel (TOTNI)		NA		
	Barium (TOTBA)	Lead (TOTPB)		NA		
	Beryllium (TOTBE)	Selenium (TOTSE)		NA		
	Cadmium (TOTCD)	Magnesium (MG)		NA		
	Chromium (TOTCR)	Zinc (TOTZN)		NA		
	Copper (TOTCU)	Calcium (TOTCA)		NA		
	Iron (TOTFE)			NA		
	Silver (TOTAG)			NA		
Green (Dissolved Metals)	Aluminum (TDSAL)	Manganese (TDSMN)	Field Filter[7]; Nitric Acid to1.3< pH < 2	NA, F	250; Nalgene Plastic[6]	6 Months
	Arsenic (TDSAS)	Nickel (TDSNI)		NA, F		
	Barium (TDSBA)	Lead (TDSPB)		NA, F		
	Beryllium (TDSBE)	Selenium (TDSSE)		NA, F		
	Cadmium (TDSCD)	Zinc (TDSZN)		NA, F		
	Chromium (TDSCR)			NA, F		
	Copper (TDSCU)			NA, F		
	Iron (TDSFE)			NA, F		
	Silver (TDSAG)			NA, F		
	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)					

Bottle Label Color	Analyte	Preservative	Preservation Code[8]	Container Size (mL)/ Material	Holding Time
Black[9]	Mercury in Biological Tissue		-20°C	20; Plastic	1 Year
Brown	Microcystins	> 0 °C & ≤ 6 °C	4C	124; Amber Glass	7 Days
Red	Gross Alpha	Nitric Acid to 1.3< pH < 2	NA	1000; Plastic	6 Months

NOTES:

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 4°C 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 21 days.
6. A 60 mL bottle may be used if collecting for cations (Ca, Mg, Na, Sr or K) only.
7. Cooling to 4°C 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.

SECTION 6: AUTOSAMPLERS

6.0 AUTOSAMPLERS

The use of autosamplers and how they are programmed to collect a water quality sample are based upon:

- Project-specific requirements found in the project's operational monitoring plan,
- Station facility constraints,
- Parameters for which samples are to be collected and
- How they are triggered (flow or time).

6.1 DEPLOYMENT AND OPERATION

Autosamplers are deployed at designated stations semi-permanently and typically housed within prefabricated enclosures equipped with a power source (hardwired or solar) and a battery.

- The standard autosampler tub holds 24 one-liter (L) discrete bottles.
    - Laboratory-cleaned discrete bottles are placed into the tub in numbered positions and secured with a plastic retaining ring and three draw cords.
    - Each discrete bottle is pre-preserved with 20 or more drops of sulfuric acid (H_2SO_4), the amount required to preserve a full discrete bottle to a pH between 1.3 and 2.0 units.
    - During the dry season when flow rates and the amount of samples collected decrease proportionately, the amount of acid in the first discrete bottle (position number 1) may be reduced to 10 drops of H_2SO_4.
- Each discrete bottle deployed in the autosampler tub must be checked weekly for contamination (e.g. insects) and replaced with a new laboratory-cleaned bottle if it is determined that the bottle is contaminated.
- Discrete bottles deployed in the autosampler tub must be replaced quarterly with new laboratory-cleaned bottles.
- Discrete bottles may be utilized up to three months from the date of laboratory cleaning if stored in a sealed, non-perforated bag.

6.2 FIRST SAMPLE TRIGGER (FST)

- The time of the First Sample Trigger (FST) must be retrieved from the autosampler at sample collection and documented on the Pre-Login Summary Report (PSR) and in the field notes for each autosampler station.
- The FST is defined as the date and time the first sample was collected by the autosampler. This date and time is considered the beginning of the holding time for the sample.
- If the FST cannot be determined, the time of sample collection from the preceding week must be used as the FST. A comment must be made on the PSR and in the field notes why this occurred.

- The Autosampler Reference Guide (Section 6.9) lists Program Complete and Last Sample Time (LST) procedures.
- Since the autosampler's internal clock does not automatically adjust to Daylight Savings Time, twice a year it must be manually adjusted to the current local time.

6.3 SAMPLE RETRIEVAL AND PROCESSING

- 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 other unforeseen constraints. Sampling spans other than seven (7) days must be documented in the field notes.
- Autosampler and grab samples must be collected at the same specific location at a sampling station and at approximately the same time. The equipment'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.
- These samples are pre-acidified and must not be filtered.
- Autosampler trigger counts can be verified on the SFWMD website as a reference prior to departure to the field: http://my.sfwmd.gov/portal/pls/portal/realtime.autosampler_report_pkg.print_autosampler_screen

1. If the autosampler collects ***nine samples or less***, the samples may be combined in one discrete bottle, capped and homogenized.
   (Jump to step **3d**.)

2. If ***more than nine samples*** have been collected by the autosampler, the discrete samples must be composited in a bucket using the following procedure:
   a. The autosampler processing bucket (~ 21 liters) must be rinsed three (3) times with site water prior to use; this is acquired by pumping site water from the autosampler pumphead tubing into the bucket. Sample water from the autosampler discrete bottles **must not be used** to rinse the autosampler processing bucket.
   b. Each discrete sample bottle must be capped, shaken and composited into the processing bucket.
   (Jump to step **3d**.)

3. If the volume in the autosampler ***exceeds the 21 liter composite bucket volume*** the discrete samples must be composited in a larger bucket using the following procedure:
   a. A larger autosampler composite bucket (~ 38 liters) must be used to collect all the 24 discrete sample bottles plus any additional discrete bottles capped and stored in the autosampler shelter during the seven (7) day sampling span.

b. 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 pumphead tubing into the bucket. Sample water from the autosampler discrete bottles **must not be used** to rinse the autosampler processing bucket.
c. Each discrete sample bottle must be capped, shaken and composited into the processing bucket.
d. 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.
e. 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 should <u>never be inserted</u> into the sample bottle.
f. 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 drops of acid added to the sample bottle must be recorded in the field notes.
g. If the pH of the sample is < 1.3, the sample must be discarded and documented in the field notes that the pH was too low to process.
    - ***The FST must be recorded when the sample is discarded***.
h. After pH verification, the sample is placed in ice in a cooler.
i. After sample collection, the remaining discrete bottles in the autosampler tub must be rotated toward position number one.
j. Replacement lab-cleaned discrete bottles must be placed at the end of the sequence and pre-preserved with enough sulfuric acid to preserve a collected sample.
k. If a processing bucket was used, it must be rinsed (3) times with AFW immediately after use at each station, placed in a clean plastic bag and sealed.

6.4 REFRIGERATED COMPOSITE AUTOSAMPLERS

A refrigerated autosampler may be installed at a station in accordance with project requirements. This type of autosampler uses a single 5-gallon polyethylene composite jug to collect samples 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 6.9.5 details the HOBO Pendant®).
- When retrieving the sample the 5-gallon composite jug must be capped, removed from the refrigerator and replaced with a laboratory-cleaned 5-gallon composite jug.

- The capped 5-gallon composite jug must be shaken to homogenize the sample. Enough sample water is dispensed into each labeled sample bottle for one (1) rinse and the rinsate is discarded prior to filling the unfiltered samples.
- The syringe is rinsed three (3) times with sample water; a filter is placed on the syringe which is then filled with sample water, the filter rinsed with a minimum of 30 mL and the rinsate discarded.
    - 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.
- Samples are preserved as required, homogenized, and checked for proper pH before being placed in ice in the cooler.
- The used 5-gallon composite jug must be returned to the lab for cleaning.
- The 5-gallon composite jug must be replaced quarterly with a new laboratory-cleaned jug, if no sample has been collected within that quarter.

6.5 REJECTION CRITERIA

Science Technicians are responsible for visually inspecting and accepting/rejecting a sample. Rejections are based on specific criteria (Table 6.5) and questions concerning the rejection of any sample should be initially directed to the STS and/or FPM. If a sample is rejected, documentation must include the following in the comment section of the PSR when applicable:

- The reason 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).

Table 6.5 Sample Rejection Criteria

Collection Type	Observation(s)	Field Action
Autosampler	Presence of insect(s) or organisms	Field personnel must discard any contaminated discrete bottle(s) and note the following information: a) Compositing period for time-composite (ACT) samples b) Amount of sample discarded and total volume collected for either ACT or flow proportional (ACF) collection c) "Not flow proportional" for flow proportional autosamplers
	Presence of vegetation particulates	Field personnel must discard any contaminated discrete bottle(s) if the presence of vegetation makes the sample non-representative of the station with the following noted: a) Compositing period for time-composite (ACT) samples b) Amount of sample discarded and total volume collected for both ACT and ACF collection c) "Not flow proportional" for flow proportional autosamplers
	Presence of unusually high amount of sediment	Field personnel must discard any contaminated discrete bottle(s) if the presence of sediment makes the sample non-representative of the station with the following noted: a) Compositing period for time-composite (ACT) samples b) Amount of sample discarded and total volume collected for both ACT and ACF collection c) "Not flow proportional" for flow proportional autosamplers

6.6 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 may 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.
    - 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 A/S program. During the purge cycle (<u>after the first rinse of the tubing</u>) of the delivery volume check, the water surface must be checked for the presence of bubbles to ensure the intake strainer extends outside of the sample tubing conduit.

6.7 PROGRAM INTERRUPTIONS

- An Autosampler Maintenance and Problem Report (Figure 6.7.A, electronically through Info Path (preferred) or current hardcopy version, Figure 6.7.B) 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: the station name, project, the A/S WQM #, ASSET # (or serial number if no asset #) and date of site visit.
- If discrete bottles are removed from the autosampler tub before the end of the sampling span, the number of bottles capped and left in the A/S shelter, total number of samples and the FST must be recorded on the Autosampler Maintenance Report.
    - When the composited autosampler samples are collected, information from the Autosampler Report must be submitted to the laboratory along with the field notes for that sampling event.
    - If the autosampler failed to collect samples and flow is observed at the time of sample retrieval a grab sample must be collected for TPO_4 analysis.

Figure 6.7.A. Autosampler Maintenance and Problem Report (Info Path)

AUTOSAMPLER MAINTENANCE AND PROBLEM REPORT [version 12]

Instructions: Please complete this form when performing ANY autosampler modification [i.e., change head at site, acquire/return A/S, change desiccant, quarterly maintenance, counts altered, change calibration volume, etc.] This form is intended for maintenance & inventory tracking purposes.

Date: Signature: Technician Initials: *

Contractor/Agency: * A/S WQM 3 Digit #: * A/S Asset #:

Station Name: * Project: Select... * A/S Head Replaced ?: Select...

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

If Replacing/Removing A/S from a Station, Where Will it be Stored ?: For Inventory Purposes

Work Performed: Select or type... * 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: Select...
- Desiccant Replaced: Select...
- Number of Bottles Replaced, (if any) /24

Parts Cleaned:

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

Inspections Completed (if applicable):

- Select... Reset Pump Count
- Battery Voltage
- (Min/Max) Refrigerator Temperature
- Internal Battery Expiration Date
- Sample Calibration Volume
- Select... 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 ?: Select... Autosampler Restarted: Select...

Comments:

CLICK HERE TO RECORD ANOTHER STATION

Form Version: 1.0.0.319

Submit Form

** If you run into any problems during the submission of this form (e.g. error messages), please Email the form** **to jclaude@sfwmd.gov. To send this from as an Email, click on 'File' and select 'Send to Mail Recipient'.**

Figure 6.7.B.

AUTOSAMPLER MAINTENANCE AND PROBLEM REPORT *[version 12]*

Instructions: ***Please complete this form when performing ANY autosampler modification [i.e., acquire/return A/S, change head at site, change desiccant, quarterly maintenance, counts altered, change cal. volume, etc.] and provide either a PDF or a hard copy to the field PM, field supervisor, & Tonya Jilek. This form is intended for maintenance & inventory tracking purposes.***

Date: _____ Contractor/Agency: _____ Technician(s) Initials: _____

A/S WQM 3 digit #: _____ ASSET # _____ Station Name: _____ Project: _____
(If no asset #, need Serial #)

A/S Head Replaced? Yes:_____ No:_____ Replacement A/S WQM 3 digit #: _____

Replacement A/S ASSET # _____ ***If Replacing / Removing A/S from a Station,***
(If no asset #, need Serial #) ***Where Will it be Stored? _____ __***
[For inventory purposes]

Work Performed (please check off): ___Quarterly Maint. ___Changed Battery ____Replaced Pumphead Tubing
____Changed Desiccant ____ Changed Program from ACF to ACT *(or)* ____ ACT to ACF
____Changed Pulse: Old # ____ New # ____

Problem Report (if any): _____
_____

Parts Replaced: (check off):

- **___ Silicon in Peristaltic Pump (Tubing EB P#_____)**
- **___ Silicon in Distributor Arm (Tubing EB P#_____)**
- **___ Desiccant**
- **___ Tygon Tubing (Tubing EB P#_____)**
- **___ Intake Strainer**
- **___ Number of Bottles, (if any) _____/24**

Parts Cleaned: (check off):

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

Inspections Completed (check off if applicable):

- **___ Reset pump count**
- **___ Battery Voltage: _____**
- **___ Refrigerator Temperature (Min/Max): _____/_____°C_____**
- **___ Internal Battery Expiration Date: _____**
- **___ Sample Calibration Volume: _____**
- **___ Checked the Color of Desiccant (circle): Blue or Pink or No Color**

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

- **Total Number of Samples: _____**
- **FST: _____**
- **# of Bottles Capped and left in the AS Shelter for sampling crew: _____**

Observed bubbles on surface of water during pump purge cycle? Yes: _____ No: _____
[This confirms tubing not clogged or up in the conduit]

A/S Restarted? Yes: _____ No: _____

Comments: _____
_____

Technician Signature: _____

6.8 MAINTENANCE

When any modifications and/or quarterly autosampler maintenance are performed on an autosampler, an Autosampler Maintenance and Problem Report must be filled out. All tubing EB P#s must be recorded when tubing is replaced.

Types of modifications may include:

- Change of pumphead tubing and pump count reset,
- Battery replacement and voltage check,
- Desiccant replacement and
- Autosampler head-controller replacement.

6.8.1 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 event and additionally changed when pumping degrades the tubing integrity.
    - The visible sections of the Tygon® intake tubing must be inspected during each sample retrieval event and must be 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 are usually located 0.5 m below the historic low mean water level. Some intakes are supported by floats that allow the samples to be collected from a constant depth.
- Whether the intake strainer is affixed to the structure or to 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 assure 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. (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 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.

Table 3.3A shows the Required Maintenance Schedule.

6.9 REFERENCE GUIDE

This section is intended for use as guidance only and applies to the use of ISCO Autosamplers. It is not intended to take the place of formal training or the specific autosampler manual. Questions concerning protocols contained in the FSQM must be conveyed to the Science Technician Supervisor, Science Technician 3 or a member of the WQM QA team.

Each time an autosampler is visited:

- The autosampler is checked for samples:
    - If samples are present, the FST and number # of samples are recorded.
    - The samples are collected and composited.
    - The unused autosampler bottles are rotated toward position 1, with new lab-cleaned bottles replaced, acidified and added at the end position(s).
    - The autosampler bottles are checked for contamination and replaced as necessary.
    - Care must be taken to prevent the unused autosampler bottles from being contaminated.
- A grab sample is collected into a graduated cylinder to determine if calibration is necessary.
- During the purge cycle after the first rinse of the tubing, there must be a visual check for bubbles to confirm the proper placement of the intake strainer (critical on fixed intake conduit).

- The desiccant indicator is checked and the desiccant is replaced if necessary.
- The time and date are checked for accuracy.
- The autosampler counts from the CR10 or MOSCAD are recorded.
- 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, making sure that the Tygon® intake tubing runs at a smooth incline up to the autosampler. This will assure water does not pool 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.

In addition to the tasks above, the following must be performed at least quarterly:

- All tubing and the strainer must be replaced.
- The autosampler, inside the bottle housing and the enclosure must be cleaned with a brush or damp paper towel.
- The battery voltage must be checked:
    - The wires are removed from the battery terminals and the connectors are cleaned if corrosion and/or debris are present.
    - The battery terminals 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 grab sample is 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.

6.9.1 Programming and Trouble-Shooting Guide for ISCO 6712 Autosamplers

6.9.1.1 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 (i.e., one more than the actual # of samples in the autosampler)

=** number of samples collected per bottle (i.e., 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 a Field Project Manager.

If the autosampler does not read 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.

6.9.1.2 Retrieving First Sample Time (FST) from Extended Program 1 - Composite Flow-Proportional (ACF) Sampling

1. The **STOP** key **(** **)** is pressed two times to return to the main menu. 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 '**Other Duties**' below).

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 Sample Time (FST)**, 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.

6.9.2 Other Duties

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.

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 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 (default to zeros)

g. The display should read**: one-part program**

h. The display should read (defaults to time):

Pacing:
Flow, Every

<u>(1-5)</u> 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.

6.9.3 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.

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 bottle is processed as an unfiltered sample.*

6.9.4 Troubleshooting Tips

6.9.4.1 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 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
  - **Solution:** The battery voltage and charger output should be checked using a voltmeter. The solar panel should be checked for cleanliness and cleaned if necessary. The battery should be replaced if the voltage is below 10V or if the problem persists.

- **Solution:** The battery connections/terminals and solar panel should be cleaned and tightened if needed.

- **<u>Missed Samples</u>** – *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.

- **<u>No liquid detected</u>** or **<u>Sensor Dirty</u>** – *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.
  - **Solution:** The intake strainer and depth should be checked.
  - **Solution:** The intake strainer depth should be checked against the usual headwater drawdown.
  - **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.

- **<u>Program Complete</u> –** *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 FST and Last Sample Time (LST) from the **Sampling Report** should be recorded in the field notes. The sample should be processed normally.
  - **Solution:** The 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 FTS.

- **<u>Program Halted</u> –** *upon arrival*:
  - **Cause:** The program was not restarted the previous week; power loss or some other event or person caused the program to halt.
  - **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.

6.9.4.2 Other Issues

- The autosampler **<u>bottles</u>** are **<u>filled to different levels</u>** - *(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:** <u>Twenty-four</u> (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 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 **<u>will not calibrate accurately</u>** - (*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 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 the tubing hose clamp should hold the strainer at the proper depth.

- The autosampler **<u>will not pump any water</u>** 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 **<u>will not stop pumping</u>** 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 **<u>not confirming / acknowledging samples / counts</u>** - *(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 **<u>should have collected samples</u>, but did not**:
- **Cause:** The autosampler may not be receiving signals from the CR10 or MOSCAD, the program was not restarted the previous week, there was a power loss or some other event or person caused the program to halt.
- **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:** 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.
- ***<u>If unresolved, the FPM must be contacted immediately</u>***.

- The autosampler **<u>display</u>** is **<u>searching for hardware</u>** 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.

6.9.5 HOBO PENDANT® Temperature Data Logger for Refrigerated Autosamplers

1. Prior to deployment:
   - The HOBO Pendant® Temperature Data Logger must be checked against the Water Quality NIST thermometer.
   - Semi-annually or with any new HOBO data loggers, NIST temperature checks in both ambient and cold conditions are performed and the serial number of each HOBO Pendant® is documented. If the HOBO temperature NIST verification ***exceeds*** ± 2 degrees Celsius, the unit is removed from use and returned to the manufacturer for evaluation.
   - Temperature check data is recorded in the HOBO Temperature Check logbook.

2. Programming:
   - Programming the HOBO Pendant® Temperature Data Logger (Part # UA-002-08 or UA-002-64) follows the manufacturer's specifications. The following settings are used upon deployment for WQM refrigerated autosamplers:
     1. For the Description, the site and date of deployment is entered (e.g. S6_010113).
     2. The serial number is verified.
     3. The battery level is verified.
     4. The data storage capacity is verified.
     5. Both of the boxes for Temperature and Light intensity must be checked.

6. The Logging interval is typically set for every **30 Minutes.** This allows for over 60 days of deployment for either of the HOBO units mentioned above. The recommended deployment is 30 days or less.
7. Start Logging function can be either set to **Now** if programming at the site or **On Date and Time** if a later time is needed.
8. After programming, each HOBO pendant is placed in a small re-sealable plastic bag with the site name, date and the Science Technicians initials written on the plastic bag.
9. The pendant is placed in proximity to the sample jug within the refrigerator. In most Isco units this would be on or close to the floor of the refrigerator.

3. Data Retrieval:

- Data download follows the manufacturer's specifications. All retrieved data for each corresponding station must be saved as an XLSX file in the appropriate file on the Water Quality Server: \\ad\DFSroot\data\kb_wqm_Data_Dropbox\HOBO_TEMPS.

SECTION 7:

INSTRUMENT CALIBRATION AND FIELD MEASUREMENTS

7.17.1 Standard Set Identification

Table 7.17.B Example of Standard Set Identification Form

7.0 FIELD TESTING

This section outlines the procedures for using field instruments to measure ambient physiochemical properties including pH, specific conductance, salinity, dissolved oxygen (DO) and temperature. Other parameters measured in the field include total depth, sampling depth, Secchi disk depth and photo-synthetically active radiation (PAR).

7.1 CALIBRATION DEFINITIONS AND REQUIRMENTS

Science Technicians must verify that all 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.

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 event 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 event. 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).

7.2 INSTRUMENT MEASUREMENT REQUIREMENTS AND GUIDELINES

The following outlines specific procedures for field testing parameters (Summarized in Table 7.2.A):

- 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 enough 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 field notes and in the comment section of the PSR.
- 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. Field parameter data are not recorded for split samples (SS).

Table 7.2.A Specific Probe Calibration Requirements Quick Reference

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	• Read after pressing "Calibrate" • 1 standard at the low end of expected sample reading range but no less than 100 µS/cm • Must be within ± 5% of True Value	• Two standards that bracket the sample value range within ± 5% of True Value • If any sample values are less than 100 µS/cm, the 100 µS/cm standard is read for the CCV • Verified at the end of the trip, or within 24 hrs after IC, whichever is less
pH	• Daily prior to use • ***pH 7 must be used first*** • A minimum of 2 standards: pH 7 and either 4 or 10		• 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 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 verification (against NIST-traceable thermometer)
	  • Level 1: < 15 ºC,
	  • Level 2: approx.40 ºC
	  • ambient temperature water
	• Must be within ± 0.5ºC of NIST-traceable readings		

7.3 INSTRUMENT FAILURE

7.3.1 Acceptance Criteria Failure

If verification fails to meet the acceptance criterion at the ***end of a sampling event***, it must be documented in the comments/trip section of the Field Notes or handwritten onto the Field Test Report (FTR), along with identifying which parameter failed and all corrective actions planned or taken with the instrument.

7.3.2 Instrument Malfunction in the Field

If the instrument malfunctions ***during the sampling event in the field***, the following steps must be performed:

- When instrument readings are unexpected (e.g. DO > 13), a CCV must be performed.
    - **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 PSR noting the station where the failure occurred. Comments must indicate what parameter failed and whether a new instrument was calibrated.
- When using HFDM, the following <u>must be transcribed</u> onto the Failed Instrument FTR (Figure 7.3.A):
    - 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.
- When a new instrument is calibrated, the calibrations must be entered into HFDM with corresponding new time(s) (replacing those of the "failed" instrument data and time(s) that have already been transcribed onto the FTR failure spreadsheet).
- If possible, all stations where the malfunctioned instrument was used should 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).
- Stations with Field Test results 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 lab 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 7.3.A Failed Instrument Field Test Report Form

7.4 INSTRUMENT CALIBRATION – GENERAL GUIDELINES

- Instrument operation is detailed in either the instrument's SOP or the manufacturer's calibration instructions.
- If a multi-parameter instrument is to be used the recommended calibration order is:
  1. Specific conductance,
  2. pH and
  3. DO.
- If the instrument does not read 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.
- For the DO probe, the membrane must be checked prior to the probe being re-calibrated. If the reading is still not within the acceptance criteria for the parameter, another instrument must 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. 20000 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.

7.5 SPECIFIC CONDUCTANCE - CALIBRATION

7.5.1 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; Analyte Free Water (AFW) is not a standard.

7.5.2 Initial Calibration (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 event.
- The standard chosen for the specific conductance calibration must be greater than the highest expected value for the sampling event 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.

7.5.3 Initial Calibration Verification (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 event.

- 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 also be within ± 5% of the standard value. If it does not, another multi-parameter instrument must be used.

7.5.4 Continuing Calibration Verification (CCV)

- At the end of the event or within 24 hours of the initial calibration, whichever is less, the conductance calibration must be verified by reading 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.

7.6 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.

7.7 pH - CALIBRATION

7.7.1 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.

7.7.2 Initial Calibration (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.

7.7.3 Continuing Calibration Verification (CCV)

- At the end of the event and within 24 hours of the initial calibration, whichever is less, the pH calibration must be verified by reading two buffers that bracket the range of values measured during the sampling event.
- 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.

7.8 DISSOLVED OXYGEN (DO) - CALIBRATION

7.8.1 Initial Calibration (IC)

- 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.
- The probe cap must be checked before calibrating an LDO (Luminescence Dissolved Oxygen) 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 the cap must be removed and the area thoroughly dried. The cap may require replacement.
- If DO will be measured during a sampling event, 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 event.
- 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.
- The temperature entered onto the 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. If it does not, another multi-parameter instrument must be used.

7.8.2 Continuing Calibration Verification (CCV)

- At the end of an event or within 24 hours of the initial calibration, 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 7.8.A.

Table 7.8.A Dissolved Oxygen (DO) Saturation

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

7.9 FIELD WASTE DISPOSAL

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

7.10 TEMPERATURE

7.10.1 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 an annually certified, NIST-traceable thermometer with a resolution of 0.1^{o}C and a range of 0°C to 100°C.

7.10.2 Calibration Verification

Field personnel ***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 multi-parameter maintenance logbook. ***A temperature probe failure must be reported directly to the WQM QA Team as soon as possible*** prior to changing the probe and/or sending the instrument out for maintenance/repair. 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.

7.10.2.1 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 ^{o}C of the NIST traceable thermometer or else the probe must be checked in a controlled temperature water bath. If the instrument does not agree with the NIST traceable thermometer, refer to 7.10.2 above.

7.10.2.2 Annual Multi-Temperature Verification

Each multi-parameter instrument must be checked on an annual 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 ^{o}C and ≤ 10 ^{o}C and the high temperature must be performed with a hot water bath between >35 ^{o}C and ≤ 42 ^{o}C. Additionally the ambient temperature verification must be performed and the information recorded in the instrument maintenance logbook.

The calibration verification is accepted if the instrument reads within ± 0.5 ^{o}C of the NIST traceable thermometer. If the instrument does not agree with the NIST traceable thermometer, refer to 7.10.2 above.

New multi-parameter instruments must be checked for high, low and ambient temperatures before they are utilized.

7.11 PHOTOSYNTHETICALLY ACTIVE RADIATION (PAR)

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

7.12 TURBIDITY

Turbidity readings are usually taken for groundwater collection projects and not for WQM projects. Requirements are specified in the FDEP SOP FT1600.

7.13 DEPLOYED INSTRUMENTATION

The procedures for instrument deployment and the manual download of field data 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.
- Calibrations (CCV) must be concluded prior to cleaning the instrument.
- All field data must be confirmed using acceptable verifications (refer to Table 7.2.A).

7.14 FIELD TESTING 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. The field parameter profiles are collected at the bottom first (0.5m from the bottom) and progress toward the surface at 0.5m increments.

7.15 SECCHI DISK DEPTH

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

- A line marked in 0.1m increments must be attached to the upper side of the Secchi disk.
- Sunglasses, unless prescription lenses must be removed. If aboard a boat, measurements must be taken from the shaded side of the boat or with the sun at the technician's back.
- The Secchi disk must be slowly lowered into the water, visually observing the disk sectors.
    a. The depth when the disk disappears must be noted.
    b. 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 noted.
    c. 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 PSR 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 depth value. The datum is then qualified with a 'S' qualifier in the database.

7.16 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. Routine maintenance includes instrument cleaning, changing the pH electrolyte and changing the DO membrane at a minimum. Field equipment maintenance frequencies are outlined in Table 3.3.B.

7.16.1 Maintenance Documentation

Field instrument maintenance activities must be documented in the instrument maintenance logbook. The identity of specific instrumentation must be designated in the documentation with a unique description or code for each instrument. 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.

7.17 STANDARDS DOCUMENTATION AND STORAGE

Specific conductance and pH standards must be initialed and dated when received then stored in the designated area by the field staff.

- 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.

Storage specifications of standards used for instrument calibration are listed in Table 7.17.A. All standard containers must be clearly labeled with their contents, the date opened and the expiration date.

Table 7.17.A Standards Storage

Chemical	Storage
pH Standards	The designated cabinet or storage area for standards and reagents must be located within an air-conditioned room for long-term storage. Standards are transported to the field within polyethylene bottles labeled with the standard set ID 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. Standards are transported to the field in polyethylene bottles labeled with the standard set ID and discarded at the end of the day.

7.17.1 Standard Set Identification

The system shown in Table 7.17.B must be used as guidance for tracking standard lot information. 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 and
- Expiration dates.

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 lot number and expiration date must be recorded and a new SSID assigned. This number must be documented on the FTR for the sampling event.

Table 7.17.B Example of Standard Set Identification Form

Date	Biopharm (BC4095)			Fisher (SB107-20, SB115-20, SB101-20)			Standard Set Identification
	720 µS	2000 µS	20,000 µS	pH 7.0	pH 10.0	pH 4.0	
10/09/12	L0123 11/13	L4567 10/13	L8901 9/13	L2345 4/13	L2345 5/13	L6789 3/13	FOCA100912
11/08/13	L7342 7/14	-	-	-	-	-	FOCA110813
2/03/14	-	-	-	L6492 5/15	-	-	FOCA020314

SECTION 8:

DOCUMENTATION

8.0 DOCUMENTATION

Documentation must be completed for each sampling event using standardized District forms (i.e., the Prelogin Summary Report (PSR) and the Field Test Report (FTR)). The original PSR, FTR and field notes must be submitted to the District laboratory at the time of sample submission.

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

8.1 SAMPLING REFERENCE DOCUMENTATION

The Water Quality Monitoring Quality Assurance (WQM QA) team shall ensure that all in-house staff and external contractors are supplied with the latest controlled copy of this manual and all Standard Operating Procedures (SOPs), and that old copies are retrieved. The original document of each revision is maintained in an organized file with the WQM QA Officer (QAO) archiving a copy of the superseded version in a specified place.

8.1.1 Quality Manual

The Field Sampling Quality Manual (FSQM) is a reference for District personnel and external contractors involved in the collection and submittal of samples for laboratory analysis and/or field parameter measurement. Copies of the current FSQM are distributed to project management, laboratory, field personnel and QA staff.

The periodic review of the FSQM and revisions shall be completed as new protocols are developed and/or clarified. FSQM policies and procedures are considered effective upon the date listed on the cover page until the date of the next revision.

8.1.2 Standard Operating Procedures

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:

a) Specific field sampling methods,
b) Calibration and maintenance of instruments and
c) Review of field data.

SOPs must be approved and signed prior to implementation and are reviewed annually and revised as needed.

8.1.3 Monitoring Plans

The Section utilizes two monitoring plans: 1) a compliance monitoring plan (CMP) written to detail specific requirements for a specific permit/mandate and 2) an operational monitoring plan (OMP) intended as an internal document, which details all components of a project and includes all mandated and non-mandated stations 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:

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

The most current Monitoring Plans and a template are available on the WQM website. The SOP for *Preparing Project Monitoring Plans* (SFWMD-QS-SOP-004) specifies the structure and content of the monitoring plans.

8.1.4 WQM QA Flash Drives

Uniquely numbered WQM QA Flash Drives containing controlled, read-only copies of all current, effective field-related SOPs, monitoring plans, electronic forms, training manual, etc. and the FSQM shall be assigned to District staff and in-house contractors involved in the collection of water quality samples. A control log is signed indicating receipt of the flash drives.

A member of the sampling team must have the WQM QA flash drive in their possession when conducting any sampling activity. Having an electronic copy of a SOP and/or the FSQM on a laptop will not suffice; the flash drive must be present and available for use. For those sampling trips (e.g. helicopter flights) where a laptop is not taken in the field, sampling personnel must have a controlled hardcopy of the related SOP.

Staff must surrender their flash drives to the WQM SOP Administrator (dates are announced via email) for updates, revisions, and/or new QA documents. When a flash drive is relinquished to the WQM SOP Administrator, the unique identifier tag will be checked, and the control log must be signed and dated, indicating the signatory has received his/her updated and/or new SOP(s)files.

Each flash drive is tagged with a bar code tag capable of being scanned by the Intermec Scanner, which must remain on the flash drive at all times. If either the tag or a flash drive is lost the WQM SOP Administrator must be notified immediately and the loss documented. A new flash drive will be issued if the previous one cannot be recovered.

8.2 SAMPLING DOCUMENTATION

Each sample must maintain a verifiable documentation trail from the time of sample collection through sample submittal to the analyzing laboratory. This is accomplished through the creation and use of a PSR associated with the appropriate field notes, a FTR and sample labels.

Hand written 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.

8.2.1 Minimum Field Documentation Requirements

All personnel responsible for collecting environmental samples and field measurements for Water Quality Monitoring (WQM) projects shall follow the following minimum requirements for field documentation.

Field data shall be recorded on a computer using District approved software such as Horizon Field Data Manager (HFDM), an Excel-based platform used for field data entry. Instructions on how to use HFDM are located in the *HFDM User Guide and Documentation SOP* (SFWMD-FIELD-SOP-018).

If ambient conditions and/or station access require data to be handwritten on a 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 file ***must be*** cross-referenced with a statement appearing on both documents confirming the information was transferred from another document (e.g. "First sample trigger date and time transferred from autosampler maintenance form", or "instrument malfunction in the field"). Any non-standard documentation used in the field 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/yy)
- **P#####:** The unique pre-login number generated by LIMS assigned for the sampling trip
- **Sample Frequency:** The corresponding frequency of the sampling trip
- **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)
    - The filter manufacturer and lot number used for each sampling trip listed in the equipment section in the "other" field or in a space provided for this information if applicable.
- **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 at the top of the

page 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 PSR 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 PSR, which is the default time in HFDM
- **Signature:** The collector's signature and the date at the bottom of the pages
- **Reviewed By:** The signature of the person responsible for reviewing the documentation prior to its submittal to the laboratory
  - 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.

8.2.2 Prelogin Summary Report Entries

A PSR is generated either by 1) printing from LIMS (Figure 8.2.2.A) or 2) retrieving from HFDM on a field computer. A PSR 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 PSR to document pertinent field data such as, but not limited to, station codes, date and time of sample collection, and sample ID numbers. Sampling trips (with multiple projects) conducted on the same day by the same sampling crew are generally documented on a single PSR (single P-number/HFDM file), which is highly recommended.

Two PSRs, Two HFDM files, One Blank: If two or more projects collected by one field crew on one trip 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 PSR and canceling the blank(s) on all other PSRs; 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 PSRs (e.g. P55555-11), a comment must be made for each **Sample #** on the other PSRs to reference the QC sample; making a note in the Trip comment alone is not appropriate.
- The comment must have the P # and dash # to reference the blank collected (e.g. refer to P55555-**11** for FCEB).
- 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: ACODE, label, bottle, etc. (e.g. P55555-11 did not have TOTAS in the

ACODE, but the other PSR did, so TOTAS must be added to P55555-11, possibly necessitating an additional bottle and label, and modification within HFDM).

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

- In *HFDM*, NOB is selected and the ACODES (or Analyses codes) are cancelled automatically. In the conductivity field, 'CANCEL' is typed to cancel all field parameters.
- 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 Acodes 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 **Comments** section of the PSR 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 (EB/FB/FCEB) 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*, NOB is selected and the ACODES are cancelled automatically. In the conductivity field, 'CANCEL' is typed to cancel all field parameters.
- 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 station visit times should be at one minute increments so HFDM can "deliver" properly. 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 (EB/FB/FCEB) is cancelled*** and ***not treated as a NOB***.

Parameters were not collected: ACODES listed on the PSR, but no samples were submitted for analysis:

- In *HFDM*, "NO" can be selected for each LAB TESTS analysis.

- For *handwritten* documentation, ACODES not requested must be crossed off with a single strikethrough line, and initialed and dated by the person making the correction.
- If several samples on the date of collection must be corrected, the "parameters crossed out by" space may be initialed instead of initialing and dating each correction.

South Florida Water Management District, DHRS Certification E46077
Prelogin Summary Report
Tuesday, February 12, 2013 13:48

Prelogin Number: P60996

Collector 1: Gator, Freddy
Collector 2: 1728
Collector 3: 627

Sample ID	Project	Col. Date Time	Station	UD	DS	WE	Type	Prog	Meth	Mat	Fst Trig Date/Time	Depth	Tdepth	SDD	# Bottles
P60996-1	ST34	1/28/2013 10:13	G376E	1	0	0	SAMP	MO	ACF	SW	1/22/2013 14:35				1
Comments: (1) Moderate sediment particulates and vegetation in sample.															
Acodes: TPO4															
P60996-2	ST34	1/28/2013 10:35	G379B	1	2	2	SAMP	MO	G	SW		0.5			6
Comments: (1) Small amount of dead floating vegetation, vegetation avoided during sampling. Light sediment particulates and vegetation in sample. Gate closed.															
Acodes: CA,CL,NH4,NOX,OPO4,SO4,TDPO4,TKN,TPO4,TSS															
P60996-3	ST34	1/28/2013 10:36	G379B	1	0	0	SAMP	MO	ACF	SW	1/23/2013 13:38				1
Comments: (1) Light sediment particulates and vegetation in sample.															
Acodes: TPO4															
P60996-4	ST34	1/28/2013 11:01	G379D	1	2	2	SAMP	MO	G	SW		0.5			6
Comments: (1) DI3751 started here. Small amount of dead floating vegetation, vegetation avoided during sampling. Gate closed.															
Acodes: CA,CL,NH4,NOX,OPO4,SO4,TDPO4,TKN,TPO4,TSS															
P60996-5	ST34	1/28/2013 11:02	G379D	1	0	0	SAMP	MO	ACF	SW	1/23/2013 15:37				1
Comments: (1) Light sediment particulates and vegetation in sample.															
Acodes: TPO4															
P60996-6	ST34	1/28/2013 11:26	G381B	1	1	2	SAMP	MO	G	SW		0.5			6
Comments: (1) Pollen covering the surface of the water, avoided during sampling. Light sediment particulates and vegetation in sample. Gate open 0.4 ft.															
Acodes: CA,CL,NH4,NOX,OPO4,SO4,TDPO4,TKN,TPO4,TSS															
P60996-7	ST34	1/28/2013 11:27	G381B	1	0	0	SAMP	MO	ACF	SW	1/22/2013 15:57				1
Comments: (1) Light sediment particulates and vegetation in sample.															
Acodes: TPO4															
P60996-8	ST34	1/28/2013 11:55	G381E	1	2	2	SAMP	MO	G	SW		0.5			6
Comments: (1) Moderate amount of floating dead vegetation and pollen in sampling area, both avoided during sampling. Light sediment particulates and vegetation in sample. Gate open 0.5 ft.															
Acodes: CA,CL,NH4,NOX,OPO4,SO4,TDPO4,TKN,TPO4,TSS															
P60996-9	ST34	1/28/2013 11:56	G381E	1	0	0	SAMP	MO	ACF	SW	1/22/2013 15:10				1
Comments: (1) Light sediment particulates and vegetation in sample.															
Acodes: TPO4															
P60996-10	ST34	1/28/2013 12:56	G372	1	1	2	SAMP	MO	G	SW		0.5			6
Comments: (1) Area clear of debris. Moderate sediment particulates and vegetation in sample. 1 pump running.															
Acodes: CA,CL,NH4,NOX,OPO4,SO4,TDPO4,TKN,TPO4,TSS															
P60996-11	ST34	1/28/2013 13:23	G372	0	0	0	SAMP	MO	ACF	SW	1/22/2013 13:16				0
Comments: (1) No Bottle. Only 1 sample taken due to distributor arm tubing coming loose from autosampler head. Sample discarded due to pH out of range. Counts reset remotely by K. Nicholas.															
Acodes: NO BOTTLE															
P60996-12	ST34	1/28/2013 13:26	G372S	1	1	1	SAMP	MO	G	SW		0.5			1
Comments: (1) Area clear of debris. Light sediment particulates and vegetation in sample. 1 pump running.															
Acodes: TPO4															
P60996-13	EAA	1/28/2013 13:43	G373	1	2	1	SAMP	MO	G	SW		0.5			1

Parameters crossed out by:_____ Collector Initials (non-signature pages only):_____ Page 1 of 3

Figure 8.2.2.A Example of a Printed Pre-Login Summary Report (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.

Glossary of Codes for Completing a PSR
This glossary is organized in the order in which the codes appear on the PSR.

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

Collector 1, 2, 3 (at top of page): The LIMS registered collector number of the person(s) who performed the sampling trip. Generic collector/project names as Collector 1 **must be** crossed off, dated and initialed.

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 an event. The station must be associated with the project code in LIMS.

Col. Date/Time: The month, day, year and time a sample is collected. Time is recorded to represent local time in the 24-hour format. (In HFDM, the format is MM/DD/YY, and the time is converted by the program to a 24 – hr 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. Collection stations that lack a reference structure (e.g. coastal sampling station) are designated undefined. Valid codes are:

- **0** Undefined, no observation, coastal sampling station, rain sample collection, no sample is collected or EB, FCEB and FB sample types
- **1** Upstream
- **2** Downstream

DS (Discharge): A code representing a visual observation of flow at the time of sample collection (required only when grab samples are collected). The observation is made from where the sampling personnel stand to collect the sample. There is no requirement to use any procedure to help in the determination of flow such as using sand or a dye to determine flow. Valid codes are:

- **0** Undefined, no observation, no sample is collected or EB, FCEB and FB sample types (The code for discharge is recorded as a "0" for coastal

sample collection, autosampler collection, rain sample collection, or if no observation is made).

1 Flow
2 No Flow
3 Reverse Flow

WE: The code for weather is recorded for grab sample collections only and must represent a visual observation of the ambient weather at the time of sample collection. Valid codes are:

0 Autosampler collection, rain sample collection, QC samples (EB, FCEB, and FB) or no observation is made
1 Clear Skies
2 Slight Overcast
3 Medium Overcast
4 Very Overcast
5 Drizzle (***Note:*** measures must be taken to protect sample from contamination and *must be documented*)
6 Rain (***Note:*** measures must be taken to protect sample from contamination and *must be documented*)

Type: Sample type. Valid codes are:

EB	Equipment Blank
FB	Field Blank
FD	Field Duplicate
FCEB	Field Cleaned Equipment Blank
RS	Replicate Sample
SS	Split Sample
SAMP	Regular Sample
FKPB	Field Kit Prep Blank (Trace Hg surface water collection only)
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. Valid codes are:

ACF	Autosampler Composite Flow Proportional
ACT	Autosampler Composite Time Proportional
ADF	Autosampler Discrete Flow Proportional
ADT	Autosampler Discrete Time Proportional
BLK	Bulk
CDI	Composite Depth Integrated
CIC	Composite Integrated Core – Sediment/Soil Only

CSI	Composite Site Integrated
DST	Drillstem Test
DRY	Dry
ELC	Electroshock
G	Grab – e.g. a Niskin (Van Dorn) water sample collector
GP	Grab Pump
HAL	Hook and Line
MAN	Manual
PKR	Packer Test
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. 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/Time (FST): The date and time the first sample was triggered on an autosampler. The FST is considered the beginning of the holding time for a sample. If the autosampler sample is discarded, the FST must be recorded.

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, blanks and stations where grabs are not collected.

Tdepth: The total water column depth required for certain projects as specified in the monitoring plan. Tdepth ***must not be*** recorded for autosampler 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" (**S**ecchi **O**n **B**ottom) is recorded in the PSR Comments.

 # Bottles: The number of bottles submitted for the Sample ID. If no bottles are submitted (NOB), 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 Acodes are struck through with a single line, which are initialed and dated by the person making the correction.
- When using *HFDM*
  - **NO BOTTLE** is selected in the **Status** field, automatically recording the number of bottles as zero,
  - the Acodes associated with the Sample ID are cancelled,
  - a **No Bottle** comment is added and
  - **CANCEL** is typed in the conductivity field to cancel all field parameters in HFDM.

COMMENTS: Any additional information concerning the *sample* or *station* that may directly affect the quality of the *field parameter results* or the *sample* (i.e., for coastal stations, comments must include tide information when applicable). Other comments may include information that needs to be conveyed directly to the laboratory. (In HFDM, comments may be added or edited by selecting the P-number, then the **Comment** button).

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.

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 Use Only: *The following information is completed by the field sampling staff:*

Field Collector Signature: 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 FSQM 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 FSQM 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 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.

Hand Transport: Samples transported in ice: The initials of the person who transported and hand-delivered the samples in ice to the laboratory

HFDM Upload: The initials of the person who uploaded the HFDM file

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

Courier Shipment: Courier Name: The name of the shipping courier for the samples

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

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

Custody Seal Applied: The initials of the person that applied the custody seal to the cooler prior to shipment

Samples Shipped In Ice: The initials of the person that packed the samples in ice prior to shipment

Lab Use Only: *The following information is completed by the 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: The initials of the laboratory log-in person who uploaded the HFDM file and Comments

Manual LIMS Entry: The initials of the laboratory log-in person who manually entered the HFDM file and Comments

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: 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 ____^{o}C 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 other comment would be placed on this line (i.e., switched samples and blanks, no bottle submitted, out of hold sample, etc.).*

8.2.3 Field Test Report (FTR) Entries

The FTR documents *in situ* field testing measurements (e.g. DO, Temp, pH and specific conductance) for most projects and must be generated at the time of pre-login. 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 uploaded into LIMS or 2) handwritten on a pre-printed FTR (Figure 8.2.3.A) and manually entered into LIMS by the laboratory login staff.

South Florida Water Management District

Field Test Report

Sample Analyst: Gator, Freddy
IC/ICV Analyst: Gator, Freddy
CCV Analyst: Gator, Freddy
Instrument ID#: 411942

IC/ICV Location: FOC
IC/ICV Solution Set ID: FOCB050113
CCV Location: FOC
CCV Solution Set ID: FOCB050113

Acceptance Criteria:	
DO	+/- 0.3 Units
Specific Conduct	+/- 5 Percent
pH	+/- 0.2 Units

Field Sample ID	Station	Tvalue	Precalibrated Reading (for IC's only)	Specific Conductance (uS/cm)	Dissolved Oxygen (mg/L)	pH	Temperature (C)	Salinity (ppt)	Date/Time Analyzed	P/F
IC#1 (QC-COND)		0	0	0					5/8/2013 7:10	PASS
IC#2 (QC-COND)		2000	2013	2000					5/8/2013 7:11	PASS
ICV#1 (QC-COND)		200		195					5/8/2013 7:13	PASS
IC#1 (QC-PH)		7	6.96			7			5/8/2013 7:16	PASS
IC#2 (QC-PH)		10	10.01			10.01			5/8/2013 7:18	PASS
IC#1 (QC-DO)		8.915	9.51		8.91		21.01		5/8/2013 7:20	PASS
P61948-1 (G)	C44S80			1006	4.73	7.94	26.46		5/8/2013 8:39	PASS
P61948-2 (ACT)	C44S80									PASS
P61948-3 (G)	C23S48			1310	5.13	8.22	25.59		5/8/2013 9:18	PASS
P61948-4 (ACT)	C23S48									PASS
P61948-5 (G)	C24S49			1721	6.56	8.27	26.47		5/8/2013 9:52	PASS
P61948-6 (ATF)	C24S49									PASS
P61948-7 (G)	GORDYRD			2793	5.92	7.59	25.25		5/8/2013 11:22	PASS
P61948-8 (ACT)	GORDYRD									PASS
P61948-9 (G)	G81			2096	6.05	7.83	25.02		5/8/2013 10:39	PASS
P61948-10 (G)	C25S50			1309	6.27	7.54	25.23		5/8/2013 12:00	PASS
P61948-11 (G)	G81									PASS
CCV#1 (QC-COND)		200		197.9					5/8/2013 14:08	PASS
CCV#2 (QC-COND)		6680		6674					5/8/2013 14:08	PASS
CCV#1 (QC-PH)		7				7.04			5/8/2013 14:09	PASS
CCV#2 (QC-PH)		10				10.08			5/8/2013 14:10	PASS
CCV#1 (QC-DO)		8.627			8.35		22.73		5/8/2013 14:16	PASS

Signature: Freddy Gator Date: 5/8/13 Reviewed By: Date: 5/8/13

5/8/20132:22 PM

Instrument Calibrated/Verified according to FDEP SOP's FT1000-FT1500 (DO calibration performed in saturated air)

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Figure 8.2.3.A Example of a Field Test Report (FTR) with a Hydrolab

Glossary of Codes for Completing a Field Test Report

Sample Analyst: The LIMS ID number of the personnel responsible for collecting the field test data

IC/ICV Location: 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. FOC LAB or G123)

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

IC/ICV Solution Set ID: A unique laboratory-specific ID number used to identify the solution set used to perform the IC and ICV

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

CCV Location: The specific location of the CCV of the multi-parameter instrument (e.g. FOC B374 or G123)

Instrument ID: The unique identifier of the multi-parameter instrument as registered in the LIMS system. (In HFDM, the drop-down menu must be used to populate this field, or "NO HYDROLAB" selected)

CCV Solution Set ID: A unique laboratory-specific ID number used to identify the solution set used to perform the 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

Precal Reading (ICs only): The value that the multi-parameter instrument reads for a particular standard or buffer prior to being calibrated

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

pH: The pH reading (units) from the multi-parameter instrument after calibration

Temperature (^{o}C): The temperature reading from the multi-parameter instrument after calibration

Salinity (ppt): 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 (In HFDM the format is MM/DD/YY, and the time is automatically converted by the program to a 24 – hr format)

P/F: Pass (P) or **F**ail (F) is recorded by the analyst (or automatically populated by HFDM)

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

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

8.2.4 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 information and Date and Time (Figure 8.2.4.A). 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.

GY	**P42722-2**	**15865002**

Project:	L8RT	Collector:	
Type:	SAMP	Station:	SW6OUT
Date:		Time:	
Preserve:	4C,SA,F	Matrix:	SW

GRAY

Acodes: NOX

Figure 8.2.4.A Pre-printed Sample Label Generated from LIMS

8.2.5 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 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. Three current types of sheets are:

1. Surface water sampling,
2. Marsh sampling (in associated SOP) and
3. Fish sampling (in associated SOP).

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

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).

South Florida Water Management District

SURFACE WATER NOTEBOOK

Client: ST34/EAA **Frequency:** Monthly **Collector1:** Gator, Freddy **Task:** Notes, Sonde, A/S
Pre-Login#: P60996 **Report Printed:** 2/12/2013 13:41 **Collector2:** 1728 **Task:** Grabs
Weather: Partly Cloudy, Temps in the mid 70s. Winds E 5 to 10 mph. **Collector3:** 627 **Task:** None
Trip Comments: 6 days between sampling event. Fish Kill present throughout STA3/4 site. Sonde failed DO in post calibration.

EQUIPMENT		ACID	H2SO4 0000013768	HNO3 K19023
Grab Bucket: 0	**Tray:** STA6	**Bt. Size**	Sample/Blank	Sample/Blank
A/S Bucket: Gumbo	**Other:** 0	**120**	**8/8**	**0**
Niskin: WQM15		60	4/4	5/5
D.I. Water: 3750, 3751	**Syringe/Filter:** Y/Y	0	0	0
	Filter mfg./Lot # Whatman Polydisc D012117	0	0	0

General Information							A/S Information								
								Pulse Settings/ Collection Frequency	Calibration			A/S Trigger Data			
Sample #	Time	Station Name	Collection method	Discharge	Suspended Solids (NV, L, M, H)	pH<2? (Y/N)	# of Samples		Target Volume	Initial Volume	Final Calibrated Volume	Samples	Confirmed	Errors	Counts Reset ? (Y/N)
P60996-1	1/28/2013 10:13	G376E	ACF	0	M	Y	24	1	100	104		24	24		Yes
Comments: (1) Moderate sediment particulates and vegetation in sample.															
P60996-2	1/28/2013 10:35	G379B	G	2	L	Y	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Comments: (1) Small amount of dead floating vegetation, vegetation avoided during sampling. Light sediment particulates and vegetation in sample. Gate closed.															
P60996-3	1/28/2013 10:36	G379B	ACF	0	L	Y	11	1	100	106		11	11		Yes
Comments: (1) Light sediment particulates and vegetation in sample.															
P60996-4	1/28/2013 11:01	G379D	G	2	NV	Y	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Comments: (1) DI3751 started here. Small amount of dead floating vegetation, vegetation avoided during sampling. Gate closed.															
P60996-5	1/28/2013 11:02	G379D	ACF	0	L	Y	13	1	100	98		13	13		Yes
Comments: (1) Light sediment particulates and vegetation in sample.															
P60996-6	1/28/2013 11:26	G381B	G	1	L	Y	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Comments: (1) Pollen covering the surface of the water, avoided during sampling. Light sediment particulates and vegetation in sample. Gate open 0.4 ft.															
P60996-7	1/28/2013 11:27	G381B	ACF	0	L	Y	27	1	100	101		27	27		Yes

Signature/Date: _____/_____ Reviewed By/Date: _____/_____ Page 1 of 4

Figure 8.2.5.A Example of a Surface Water Sampling Field Note Sheet

8.2.5.1 Surface Water Field Note Entries

The surface water field note sheet (Figure 8.2.5.A) must be completed with the following information:

- **Client:** Name of the project (e.g. STA6)
- **Date:** In the format mm/dd/yy
- **Pre-Login #:** The unique number generated by LIMS for this sampling trip
- **Frequency:** The corresponding frequency of the grab samples taken during this sampling trip
- **Collectors and Tasks:** The LIMS registered collector number(s) of the personnel performing the sampling and the corresponding responsibilities for each collector (e.g. 123 - grabs, processing; 456 - hydrolab, notes)
- **Weather:** 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/methodologies 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)
    - The manufacturer of the filters and lot number
    - The AFW used for the sampling event 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 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 #:** The hyphenated suffix of the P-number
    - **Time:** 24-hour format (e.g. 1430) time must correspond to the same time labeled on the sample tags and PSR. This is recorded at the time of sample collection.
    - **Station Name:** The PSR 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)
    - **Discharge:** A visual observation of flow recorded when a grab sample is collected (at the time of sample station visit)

Valid codes are:

- 0 No observation made
- 1 Flow
- 2 No Flow
- 3 Reverse Flow

- **Amount of Suspended Solid:** 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 Yes
    - when the pH of the processed grab is < 2
    - when the pH of the processed/composited autosampler sample is < 2
      - ***If additional acid was added*** to an ACT or ACF sample, it ***must be*** noted in the comment section of the field notes for the sample (e.g. Comment: "Added 2 drops of H_2SO_4 to sample").
  - N No
    - Not Applicable or leave blank

- **A/S Information**
  - **# of Samples:** The number of samples collected by the autosampler
  - **Pulse Settings/Collection Frequency:** For ACF autosamplers, the number of pulses for which the autosampler is set
  - **Target Volume:** The programmed aliquot or volume of sample (e.g. 100 mL)
  - **Initial Volume:** The volume of sample the autosampler collected during the first calibration check (e.g. 97 mL)
  - **Final Calibrated 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.
  - **Samples:** The number of requested 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.
  - **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.

- **Errors:** The number of autosampler trigger errors recorded from a 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.

- **Comments:** Information that may affect the quality of the sample or field parameters. General guidelines for observations include the following:
  - Information documented should describe the sample, sampling activities and surrounding sampling conditions that might affect sample quality. Some examples are:
    - All gates are open 1.0',
    - Construction is taking place 100' upstream of the sampling station,
    - The sample has a very light amount of fine suspended solids with vegetative particulates,
    - Mary Smith the Field Project Manager 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 or auditors) and
    - Station is choked with water hyacinth, ash fallout from crop burning, fish kill, etc. (ambient conditions).
  - Observations must be clearly documented such that end users will understand them.
  - Special characters (e.g. ! @ # ^ ( ) & * " ' < > etc.) with the exceptions of commas (,), colons (:) and periods (.) must not be used in HFDM or handwritten comments.
- **Signature/Date:** The signature of the field sampling technician responsible for documentation and the date
- **Reviewed by/Date:** The signature of the person responsible for reviewing the documentation and the date

8.3 DOCUMENTATION CORRECTION PROCEDURES

For corrections to be made to documentation specific procedures must be followed and general factors must be taken into account.

- Prior to submitting the samples to the laboratory, corrections can be made to the original PSR, FTR and/or field notes by field sampling staff.
- After submitting the samples to the lab (i.e., the PSR, FTR and field notes have passed through the laboratory login), a correction form with attached supporting documentation must be submitted to Data Validation Unit and approved by Data Validation personnel before a correction can be made in LIMS.
  - This correction form (LIMS/DBHYDRO Water Quality Data Investigation and Correction Form) must be attached to the original

field document for reference along with a copy of the corrected PSR, FTR and/or field notes marked "Corrected Copy" by Data Validation personnel.
    - Original HFDM files cannot be modified once the file is delivered (i.e., uploaded) to LIMS.
        - Screen shots of the original HFDM files can be used as supporting documentation when corrections are made by the sampling personnel to the original signed PSR, FTR and/or field notes.
- A correction form for field data or field calibration/verification information must be submitted to the WQM QA team by the sampling personnel.
- A correction to field documentation after data have been loaded to DBHYDRO must be approved by the Data Validation Unit of the Analytical Services Section

Other general factors for documentation correction are:

- A written correction must be struck through with a single line and dated (month/day/year) 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)
- Corrections based on assumptions or recollections are **not** accepted.
- Information based on direct field observations (e.g. DS and WE codes or sample depth) cannot be corrected after leaving the sampling station.
    - If additional information (e.g. stage data or gate settings/positions) is available that contradicts a direct field observation, it may be added as a comment to the sample data by the FPM, but cannot be used to change the field observation.
- Only information regarding samples submitted to the laboratory is reflected on a PSR. Information pre-printed on a PSR, but not related to samples submitted to the laboratory (e.g. sampling depth of 0.5 preprinted on the PSR even when the sample is NOB) **must be** considered as correctable information and treated as such using the correction procedures outlined above.

8.4 FIELD DOCUMENTATION REVIEW

As discussed, each sampling personnel is responsible for ensuring the accuracy and completeness of the pre-login summary report (PSR), field test report (FTR) and field notes prior to submission to the laboratory. Additionally, Field Project Managers (FPMs) review field notes for comments that may indicate any affect on the quality of the samples. The FPM enters comments directly into LIMS and may request appropriate qualifier(s) or a Project Manager Remark (PMR) to be associated with the sample(s). These processes are described in the *Standard Operating Procedure for Review and Correction of Monitoring Event Documentation* (SFWMD-FIELD-SOP-003).

8.5 DOCUMENT CONTROL AND RECORDS RETENTION

Controlled documents are those uniquely identified such that an organization can maintain control over the distribution, use and fate of the document. SOPs, quality manuals, monitoring plans and other technical documents ***must be*** controlled to prevent alteration or use of outdated copies. Supervisors and the QA Team must assure that staff is supplied with the latest controlled copies and that old copies are removed from access. At least one of each revised copy of these documents must be retained by the WQM QAO. Documents used by the field technicians are distributed using the Flash Drive described in Section 8.1.4. These processes are described in the *Archive Records Storage and Retention SOP* (SFWMD-FIELD-SOP-022).

SECTION 9:

FIELD QUALITY CONTROL MEASUREMENTS AND REQUIREMENTS

9.0 FIELD QUALITY CONTROL

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

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

Consequently, all field QC check samples **must be** prepared on-site. In some cases, 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 environment.

Blanks demonstrate that the collected samples have not been contaminated by:

- Ambient environmental conditions,
- Equipment used for sample collection,
- The sample container,
- Analyte-free water,
- The suitability of sample preservatives,
- Sample transport and/or storage conditions, and/or
- Laboratory processes.

For the purposes of data validation, *all* blanks are associated with *all* samples collected on a single sample trip. The recurrence of blank results greater than the method detection limit may be indicative of a systemic issue.

9.1 FIELD QUALITY CONTROL CHECKS

All QC checks (Table 9.1.A) are preserved and handled as routine samples, then submitted to the laboratory along with the samples for each sampling event. 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 rate of 5% of the total number of samples collected for the life of a project.*

All field QC check samples must be conducted on-site. The procedures for collecting the field QC check samples are provided in the following sections.

9.1.1 Equipment Blank (EB)

An Equipment Blank is prepared using sampling equipment that has been brought to the site pre-cleaned and must be collected before the equipment has been used.

- If samples are collected more frequently than quarterly (or bi-monthly), then one EB is collected each quarter (per project).
- For projects collected less frequently (e.g. every quarter or every two months), the EB is collected every other event.
- EBs ***must not be*** prepared in advance at the base of operations and must be collected at the first station where a sample is collected, which may or may not be the first station visited, before the sample collection equipment is used.
- If possible, the first station should be the station with the longest parameter list.

- The EB must be collected to match a list of all parameters sampled (via grab sample) for the projects associated with the sampling event.
- 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).
- 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.

EB Collection Method:

- A single train of sampling equipment must be used to collect an EB (the autosampler equipment is combined with the grab sampling equipment).
- The equipment and sample bottle ***must not be*** rinsed prior to collection of an EB.
- EBs must be prepared by pouring enough volume of AFW to fill the samples bottles through each piece of sampling equipment and collecting the rinsate into the sample collection container.
- 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 the sample bottle label.

9.1.2 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.
- If it is known at the beginning of the trip that only one sample will be collected and no equipment will cleaned in the field, an EB must be collected.

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 collecting the rinsate into the sample collection containers.
- 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.

9.1.3 Field Blank (FB)

A Field Blank monitors on-site sampling environment, sample container 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 event or when there are obvious concerns of environmental contamination during sample collection or processing (e.g. construction dust, ash, etc.).

- FBs collected for this purpose 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 include each parameter requested for the sampling trip.

FB Collection Method:

- The sample container must be rinsed once prior to filling with AFW.
- The FB must be collected by pouring AFW directly into the sample container(s), keeping each sample container(s) open for the same approximate time interval as the collection and processing of the corresponding sample container(s) and preserving the sample as necessary.

All field blanks or equipment blanks must be preserved with the <u>greatest</u> amount of preservative that was required in the associated sample set and the amount noted in field documentation. Excess acid preservation may interfere with laboratory analysis of the sample.

9.1.4 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.
- Two RSs must be collected per quarter, per project, at the same station, on the same day for the longest parameter list.
- RSs need not be collected for a project during a given quarter if no samples were collected during that quarter.

- Field Duplicates (FD) were historically collected by the District but this sample type is no longer routinely collected, although some projects may require a single RS (e.g. L8RT). If only one RS is collected, the sample type must be changed to FD.

9.1.4.1 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.

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.
- Sampling equipment does not have to be cleaned with AFW between the sample collection and each RS collection.
- 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.

9.1.5 Split Sample (SS)

Split samples are collected to evaluate inter-laboratory performance and are collected as a subsample of the parent sample.

- Before a SS is collected, all involved parties should agree on:
    - The logistics of sample collection,
    - The suppliers of the preservatives and containers,
    - The analytical methods, and
    - The statistics that will be used to evaluate the data.
- A SS is collected for selected projects only.
- The routine sample plus two (2) SSs must be consecutively processed from the same sample collection effort for all required parameters. The result should be three (3) chemically identical samples. These samples are submitted to three different laboratories.
- In special cases, a single split sample may be collected if required by the project (e.g. EVPA).

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.

9.1.6 Filter Lot Blanks

- Each filter lot purchased directly by the District or contractors 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.

9.1.7 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.

ASEB Collection Method:

- An ASEB must be collected from a single precut ISCO silicone Pumphead tubing per batch of identical lot numbers.
- An ASEB for the silicone tubing used for the autosampler distributor arm must be collected from a minimum 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.
- Multiple lot numbers would require multiple ASEBs.
- When the silicone tubing is taken out of its original box / bag, it must not be stored in the original bag as these 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 for TP, TKN and NOX ***must not be*** filtered.
- AFW is run directly from the AFW faucet in the lab, through the tubing and into the bottle.
- After an ASEB is collected, the tubing must be placed in a bag and sealed 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.

ASEB Documentation:

- The PSR 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 **EXP** 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".
- 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.
- ASEB results will be retrieved from LIMS by the Autosampler Coordinator and 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.

9.2 FIELD INSTRUMENT CALIBRATION VERIFICATION STANDARD

A check standard is used to verify the calibration of the field instruments at the beginning (**I**nitial **C**alibration **V**erification (**ICV**)) and at the end of a sampling event (**C**ontinuing **C**alibration **V**erification (**CCV**)). Field test data collected are validated by a member of the WQM QA team. Data associated with a failed calibration or calibration verification (CCV) are qualified with a 'J' qualifier as estimated.

Table 9.1.A Field Quality Control Checks and Requirements

QC Type	# Samples	Frequency (All Parameter Groups)	Review Element Criteria
Equipment Blank (EB)	One	• One per quarter must be collected on-site prior to sampling • When an FCEB or FB is not collected • For autosampler tubing, an ASEB must be collected	Qualify EB result if ≥ tested analyte's MDL. Qualify associated sample(s) if the result is < 10 times the blank value. Associated samples include all samples collected on the same sampling trip (day) by the same sampling crew and equipment.
Field Cleaned Equipment Blank (FCEB)	One	• One per trip must be collected where field equipment decontamination occurs	Qualify the FCEB result if ≥ tested analyte's MDL. Qualify all sample associated results with concentrations <10 times FCEB value. Associated samples include all samples collected on the same sampling trip (day) by the same sampling crew and equipment.
Field Blank (FB)	One or more	• Required when sampling directly into sample bottle and/or an EB and FCEB is not collected • Discretional if contamination due to processing environment is suspected	Qualify FB result if it is ≥ tested analyte's MDL. Qualify associated sample results < 10 times blank value. Associated samples include all samples collected on the same sampling trip (day) by the same sampling crew and equipment.
Replicate Sample (RS)	Two	• Two per quarter per project from the same station, on the same day	Provide feedback to the affected group and initiate troubleshooting or other corrective action. The replicate sample data and the sample data collected at the same station are qualified with a 'J' qualifier if the Relative Standard Deviation (RSD) is greater than 20%.
Field Duplicate (FD)	One	• FDs are collected only for selected projects.	Provide feedback to the affected group and initiate troubleshooting or other corrective action. The duplicate sample data and the sample data collected at the same station are qualified with a 'J' qualifier if the Relative Percent Difference (RPD) is greater than 20%.
Split Sample (SS)	Two	• SSs are collected only for selected projects.	Provide feedback to the affected laboratory and initiate troubleshooting or other corrective action with that lab. Relative Percent Difference (RPD) or Relative Standard Deviation (RSD) criterion: 20%.

9.3 DATA QUALIFIER CODES

If field and/or laboratory data need to be qualified the codes used are listed in Table 9.3.A.

Table 9.3.A Data Qualifier Codes

Qualifier/ Remark Codes*	Definition
PMR	Project Manager Remark. Qualifier set at project manager's request. Does not produce a "yes" in the flag column in DBHydro.
PMF	Project Manager Flag. Qualifier set at project manager's request. Does produce 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.
J	Estimated value; value may not be accurate (number codes specified below used in LIMS only).
K	Actual value is known to be less than the value given.
I	The reported value is between the lab method detection limit and the lab 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.
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	Analysis done after the approved holding time.
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.
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 lab or field protocol (LIMS-specific, only 'J' is transferred to DBHYDRO).

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

SECTION 10:

PERFORMANCE AND SYSTEMS AUDITS

10.0 WATER QUALITY MONITORING AUDITS

Audits, as mandated by the FDEP SOPs (DEP-SOP-001/01), are routinely performed by the QA Team as part of the WQM Quality Assurance program to assess compliance with the FSQM, field SOPs and project-specific quality assurance plans. A description of the field audit protocols are described in the SOP for *Conducting Field Audits* (SFWMD-FIELD-SOP-012).

10.0.1 System Audits

A systems audit is used to evaluate the entire sample acquisition system; sample collection process, equipment cleaning and submission of the samples to the laboratory. Each step of the process is evaluated for conformance to appropriate methodology, approved procedures and the appropriate QA plans/manual, or SOPs. A list of any deficiencies discovered must be made and subsequently addressed to correct, improve, or modify the system.

10.0.2 Performance Audits

Performance audits are used to evaluate the results of training or to determine the performance of an individual, sampling team, or methodology. Performance audits are generally directed toward specific tasks within the overall system. The audit may involve reviewing data collected by the individual or team and/or actual observation of the work performed.

10.1 DATA AND DOCUMENTATION AUDITS

Field documentation and data audits are conducted for selected projects and incorporated into routine systems audits. The purpose of these audits are to assess the quality and traceability of data collected, documentation is of acceptable quality and to validate the integrity of sample collection and field measurements. Documentation usually reviewed includes:

- Monitoring and other project plans
- Contractual SOW's
- Applicable SOPs
- PSRs
- Field notes
- FTRs
- Field cleaning logs
- Instrument maintenance logs
- Data sheets and data deliverables
- Correction requests
- LIMS and DBHYDRO database entries.

10.2 AUDIT REPORTS

A report written by the auditor summarizes any deficiencies found during an audit with corrective actions, process improvements and/or recommendations listed in Table 1. The auditor submits the audit report to the Science Technician Supervisor (internal) or

Contract Manager (external) with copies also sent to the FPM, Section Leader in charge of auditors, the WQM QA Team, and the Section Administrator. The Science Technician Supervisor (internal) or Contract Manager (external) must respond within thirty (30) days from receipt of the audit report with a corrective action/process improvement plan and implementation schedule for any deficiencies identified. Upon receipt of the auditee's response, the auditor accepts or rejects the auditee's corrective action/process improvement plan and implementation schedule within 10 business days. If rejected, the auditee must revise their corrective action/process improvement plan and implementation schedule and resubmit for approval by the auditor within ten (10) business days.

SECTION 11:

ADMINISTRATIVE RESPONSIBILITIES

11.0 ADMINISTRATIVE RESPONSIBILITIES

Water Quality Monitoring Section (WQM) is the primary water quality sampling group at the District. WQM employs sample collection, field project management, and supervisory staff. The Section utilizes the services of local governments and private sampling contractors to perform field sampling for projects that exceed in-house capacity.

11.1 WORKLOAD REVIEW, ALLOCATION, AND PLANNING

Monitoring work is accepted based on available resources and is either requested during the budget preparation process or during the year through a special request. The budget request form details the work involved, estimated time to complete a task, and budget codes. WQM management reviews the request against available time and resources. All new monitoring and major changes to existing monitoring programs must be approved by the SFWMD Environmental Monitoring Review Process Team (EMRP).

For planning purposes, all field units within WQM maintain a sampling calendar that which illustrates the allocation of personnel and resources to specific projects on a daily basis.

WQM supervisors and management also review the available material resources (e.g. equipment, instrumentation, and space) during budget planning and when new work is requested.

11.2 SCIENCE TECHNICIAN TRAINING AND DEMONSTRATION OF CAPABILITY

Qualifications include a minimum number of years of experience and an Associate's Degree in Natural or Physical Science or related field for a WQM Science Technician. Field personnel are trained on WQM sampling techniques and safety procedures through a formal training program. Cross-training is done both within and among units on various field sampling and testing procedures. Before independently performing a task, each Science Technician must be trained on that specific procedure. Additionally, he/she must have prior training in ethics (see Section 1), the principles of collecting water quality samples in a variety of settings, safety protocols, QA/QC, maintenance and troubleshooting, and documentation. A training log must be completed and signed by both the trainer and the trainee for all training conducted. The training documentation is audited as a part of the normal systems auditing process. Science Technician training procedures are described in the *SOP for WQM Science Technician Training* (SFWMD-FIELD-SOP-015). Each new employee must be audited within their first six months of employment.

11.3 EXCEPTIONS AND VARIANCE FROM QA/QC REQUIREMENTS

It is the responsibility of individual Science Technicians and their Science Technician Supervisor to make every effort to operate under the strategy outlined in project-specific monitoring plans, appropriate SOPs, and the requirements outlined herein. In the event that a variance to a proscribed 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. These must be noted in the field documentation and appropriate Science Technician Supervisors, QAO and FPMs must be notified. Data may be qualified depending on the scope and nature of variance.
- For major sampling or testing variances, a performance validation study must be conducted and evaluated. 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 might seek approval from FDEP or USEPA if for 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, Field Project Managers, QAO, and Section Administrator.

11.4 HANDLING COMPLAINTS

To comply with permits and mandates, and be accountable to oversight bodies, other government agencies and the general public, all of the sampling, QA, and management personnel make every effort to assure data quality and integrity. Complaints related to sampling are addressed promptly.

Data stored in the District database are accessible to other agencies and the public. Problems related to data must be routed to the WQ Data Steward. In some cases, QA staff, FPMs, and/or Science Technician Supervisors may be involved with investigating and/or implementing the corrective action associated with data. The investigation process may involve checking analytical runs, field notes, or other documentation. In addition, interviews with sampling and/or laboratory staff and QA audits may be necessary. If the cause of the problem is identified, the affected data would be qualified as appropriate, using a standard FDEP qualifier code in the database. Written notification of the findings and resolution must be sent to FPMs and known stakeholders via email or through a formal memorandum as required.

11.5 PROTECTING CONFIDENTIALITY

Data generated from all monitoring activities in the District are public information and thereby must be made available to any interested parties under the Florida Public Records Law.

Appendix A: WQM Training Manual

Introduction

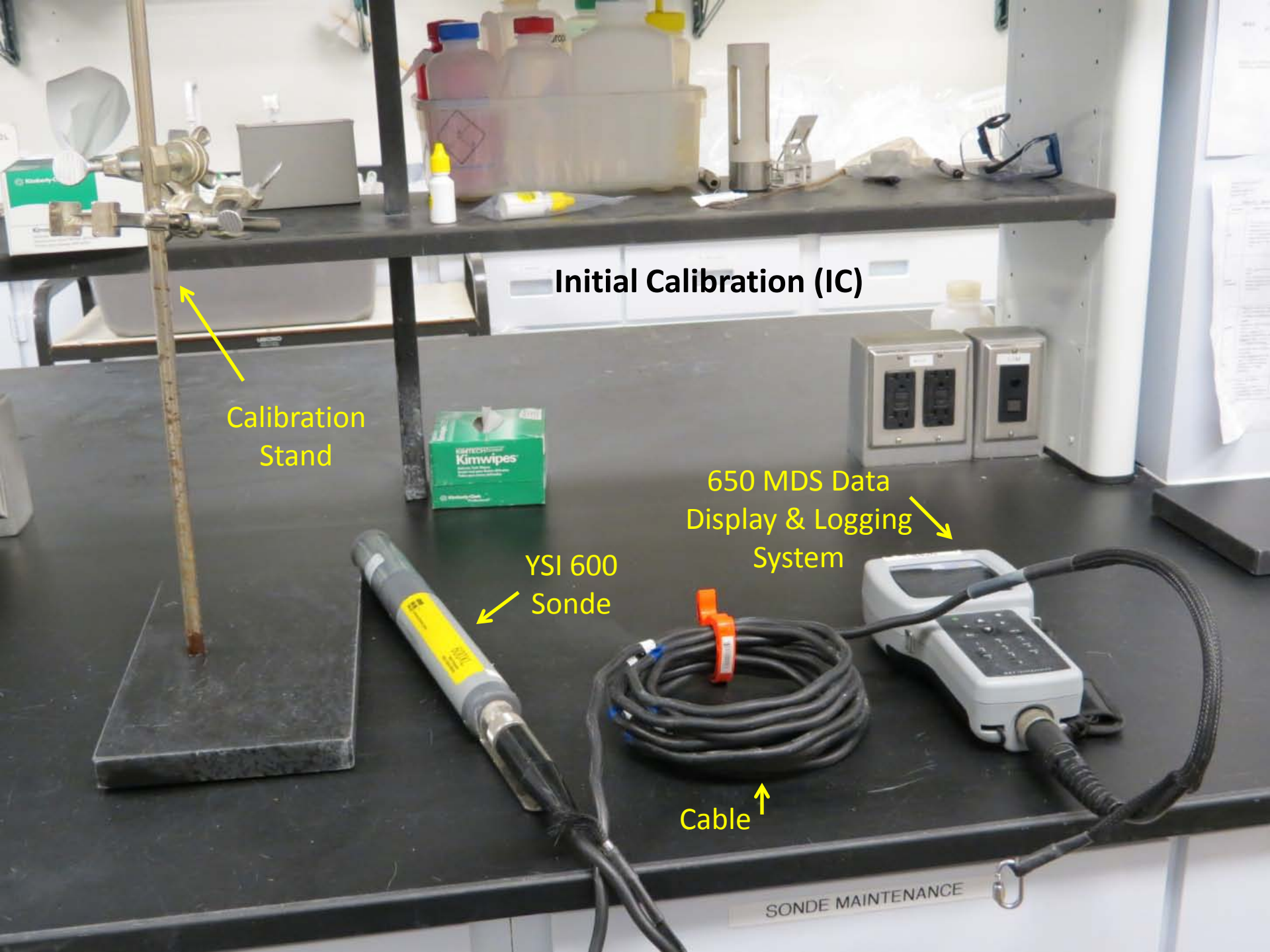
This training manual is intended as a guide for training personnel on detailed procedures specified in the FSQM. Project-specific requirements are found in the monitoring plan or procedure-specific SOP. Questions about project-specific requirements should be addressed to the Field Project Manager or the Field Technician Supervisor. Questions concerning protocols contained in the FSQM must be referred to the Sampling Technician Supervisor, QAO or other member of the WQM QA team.

- Surface Water Grab Sampling Guidance
- Autosampler Guidance
- Field Equipment Decontamination Guidance (field)
- Field Equipment Decontamination Guidance (lab)
- Field Cleaned Equipment Blank_FCEB_Guidance
- Multi-parameter Instrument Calibration (YSI) guidance
- How to Repair a Niskin
- Marsh Sampling by Helicopter _Flowchart
- OLIT Sampling by Helicopter_Flowchart

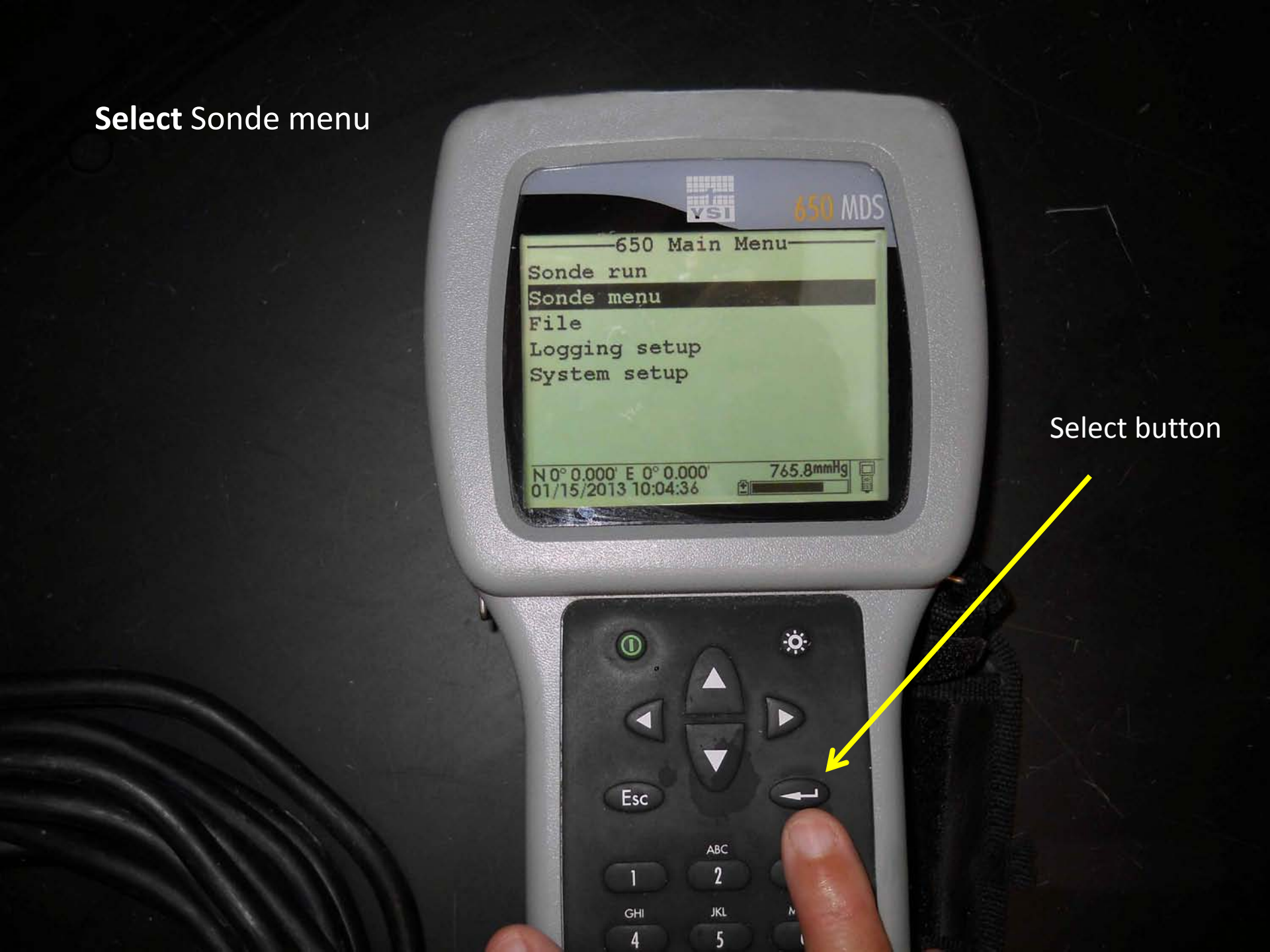
Multi-parameter Instrument Calibration Guidance

SFWMD FSQM Section 7

YSI


Initial Calibration (IC)
Calibration Stand
650 MDS Data Display & Logging System
YSI 600 Sonde
Cable
Kimwipes
SONDE MAINTENANCE

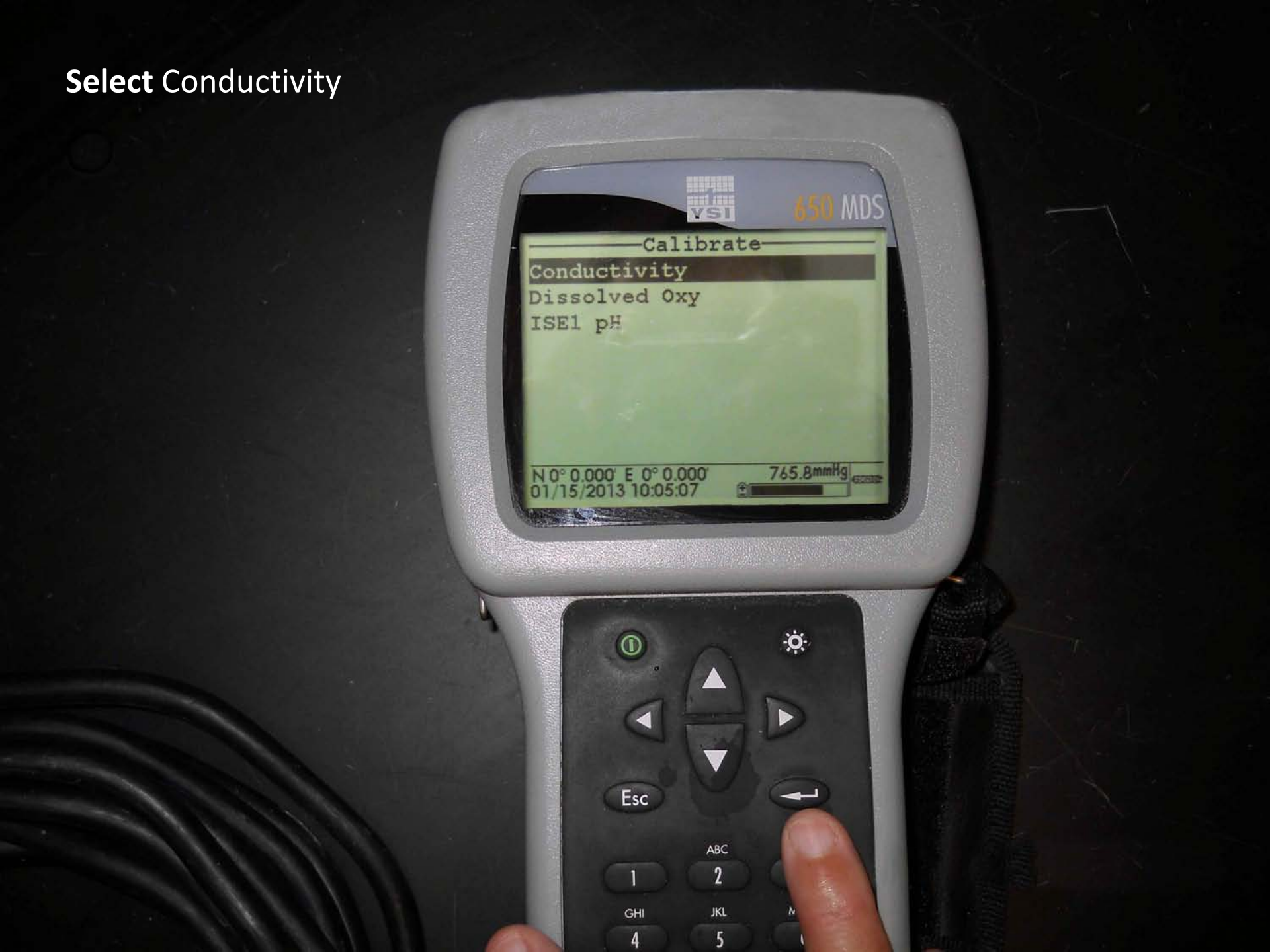
Select Sonde menu



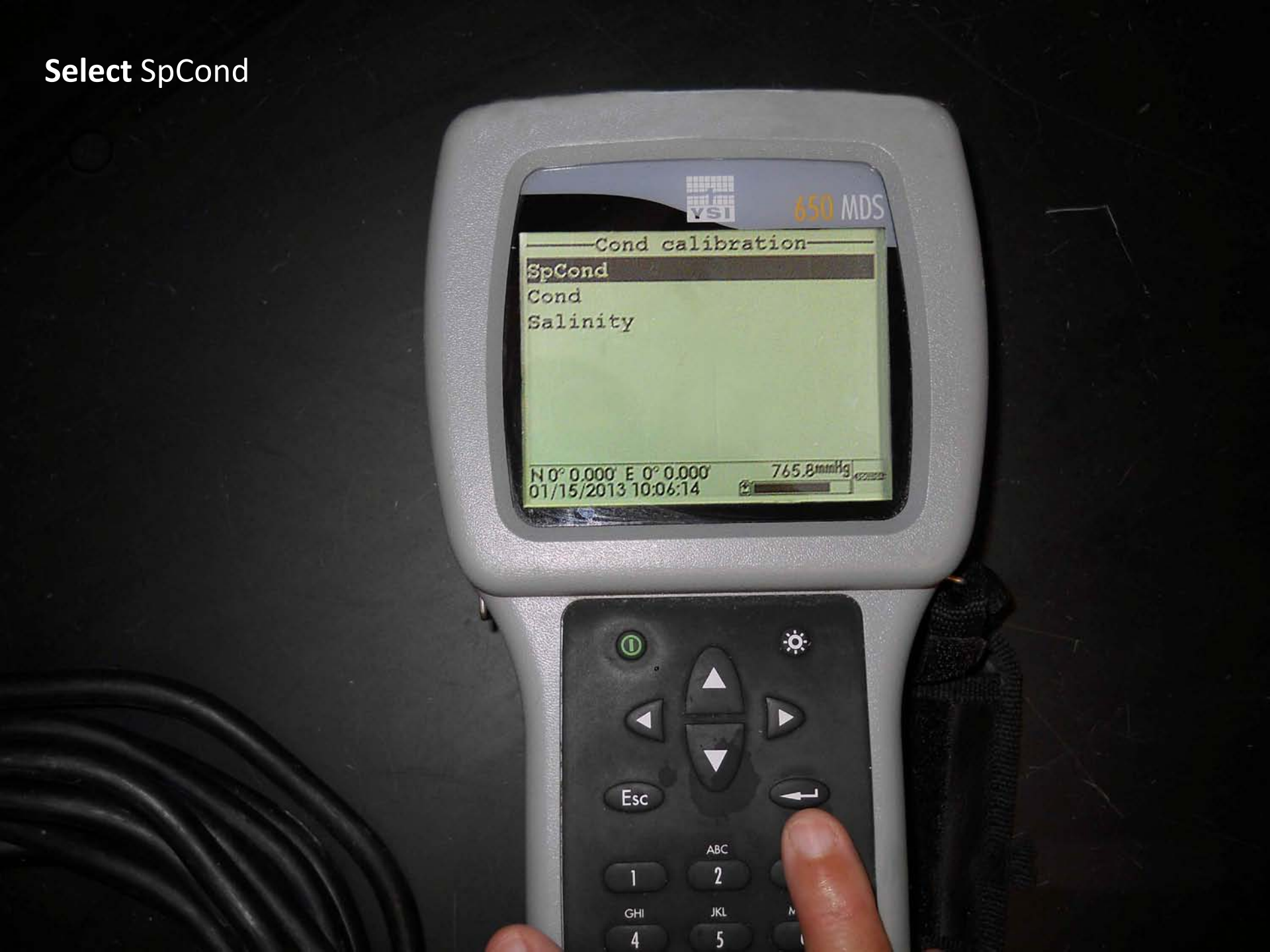
Select button

Select Calibrate

Select Conductivity



Select SpCond



If starting with 2000 conductivity solution, **type** “2.” mS / cm and **select**

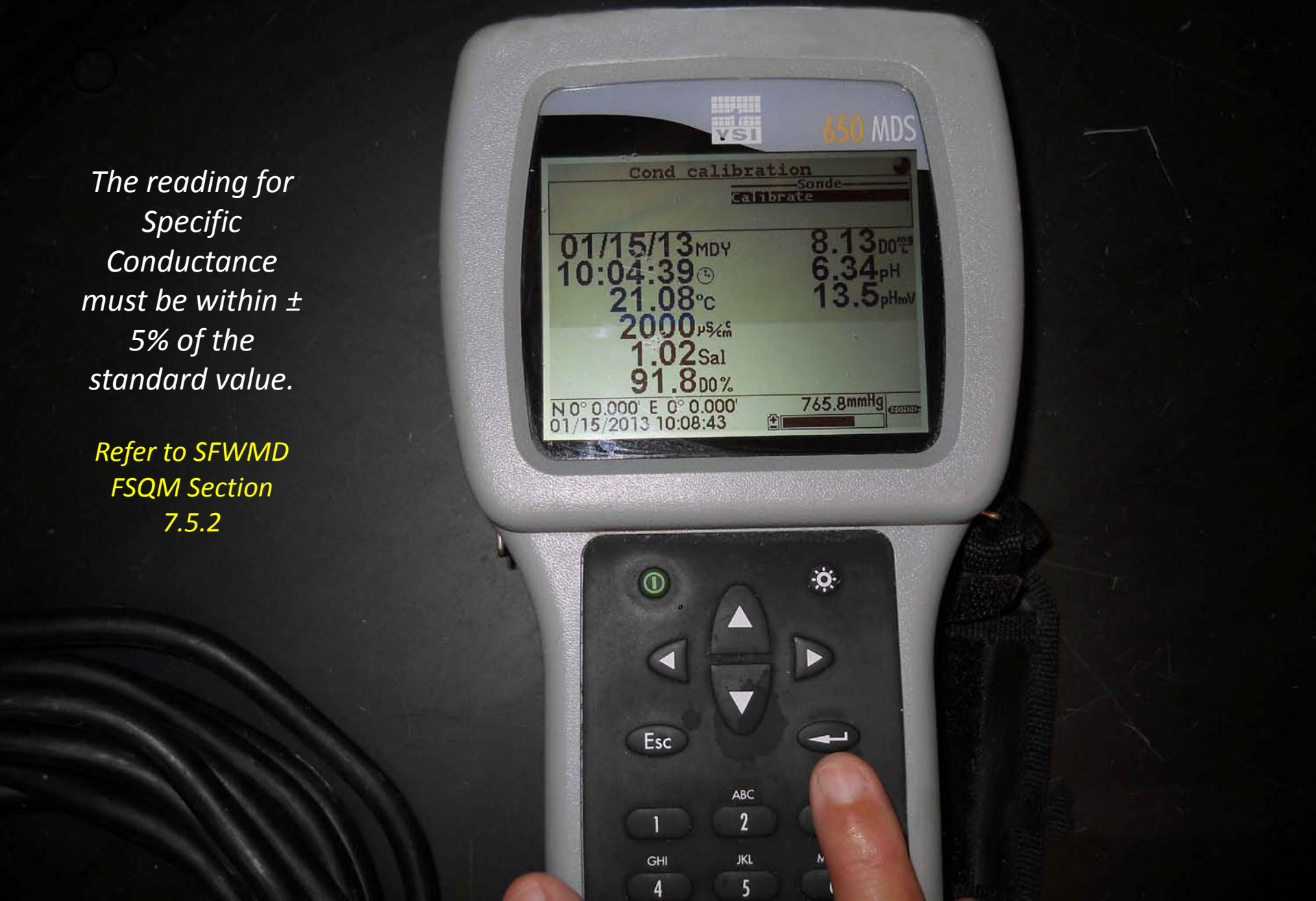
Rinse probes with Analyte-Free Water (AFW)

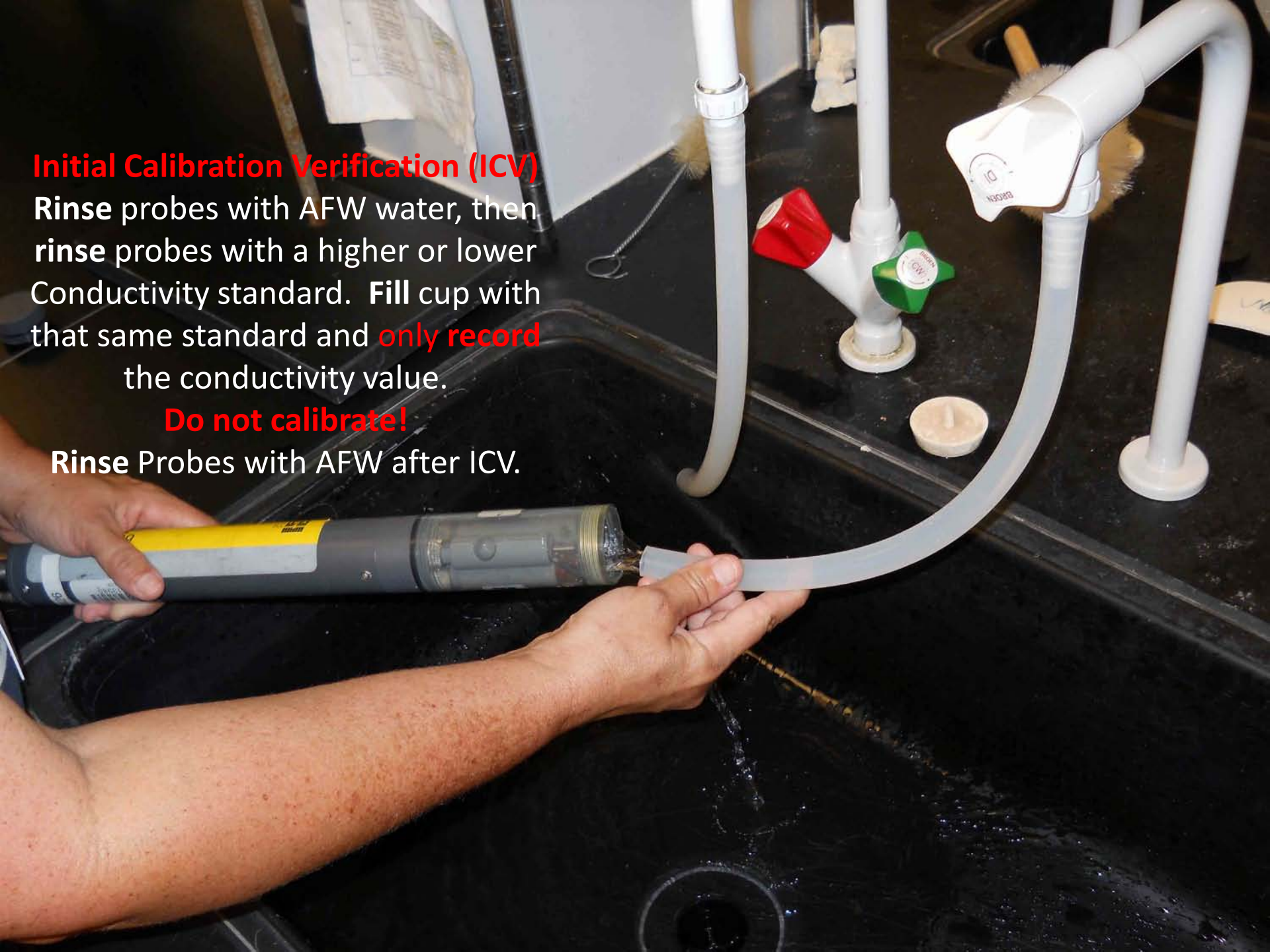
Rinse probes with Conductivity 2000 standard by filling cup and discard standard.
Then **fill** cup with 2000 standard

Record the pre-calibration reading, **select** calibrate for the Conductivity 2000 and **record** the calibrated value (µS/cm)

The reading for Specific Conductance must be within ± 5% of the standard value.

Refer to SFWMD FSQM Section 7.5.2




Initial Calibration Verification (ICV)
Rinse probes with AFW water, then **rinse** probes with a higher or lower Conductivity standard. **Fill** cup with that same standard and only **record** the conductivity value.
Do not calibrate!
Rinse Probes with AFW after ICV.

Rinse probes with pH 7 buffer by filling cup and discard buffer. Then **fill** cup with pH 7 buffer

Select ISE1 pH

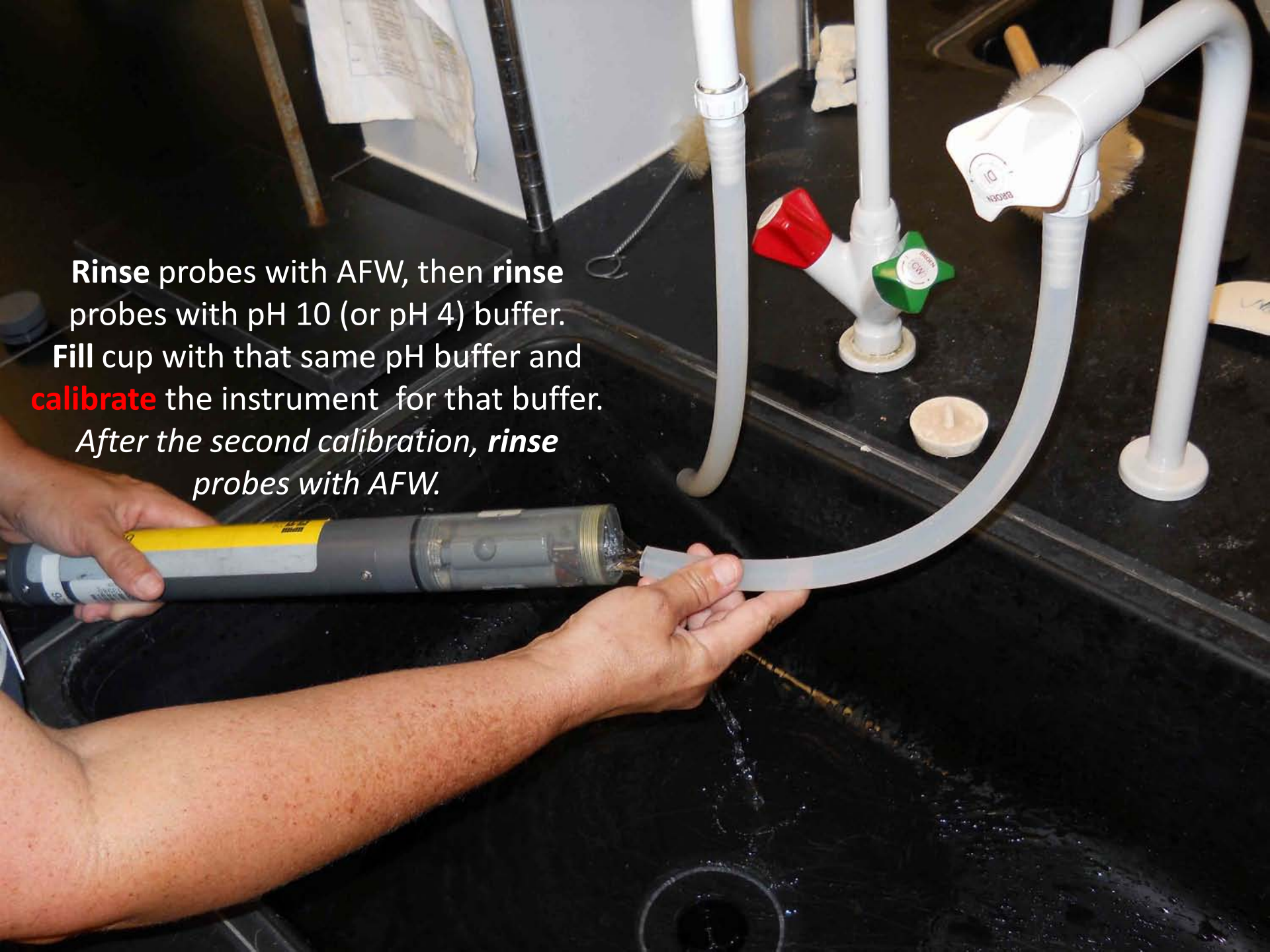
Select 2 point

Enter 1st pH 7, then **select**

Calibrate the instrument for pH 7

The instrument must read within ± 0.2 standard pH units of the calibration buffer's True Value.

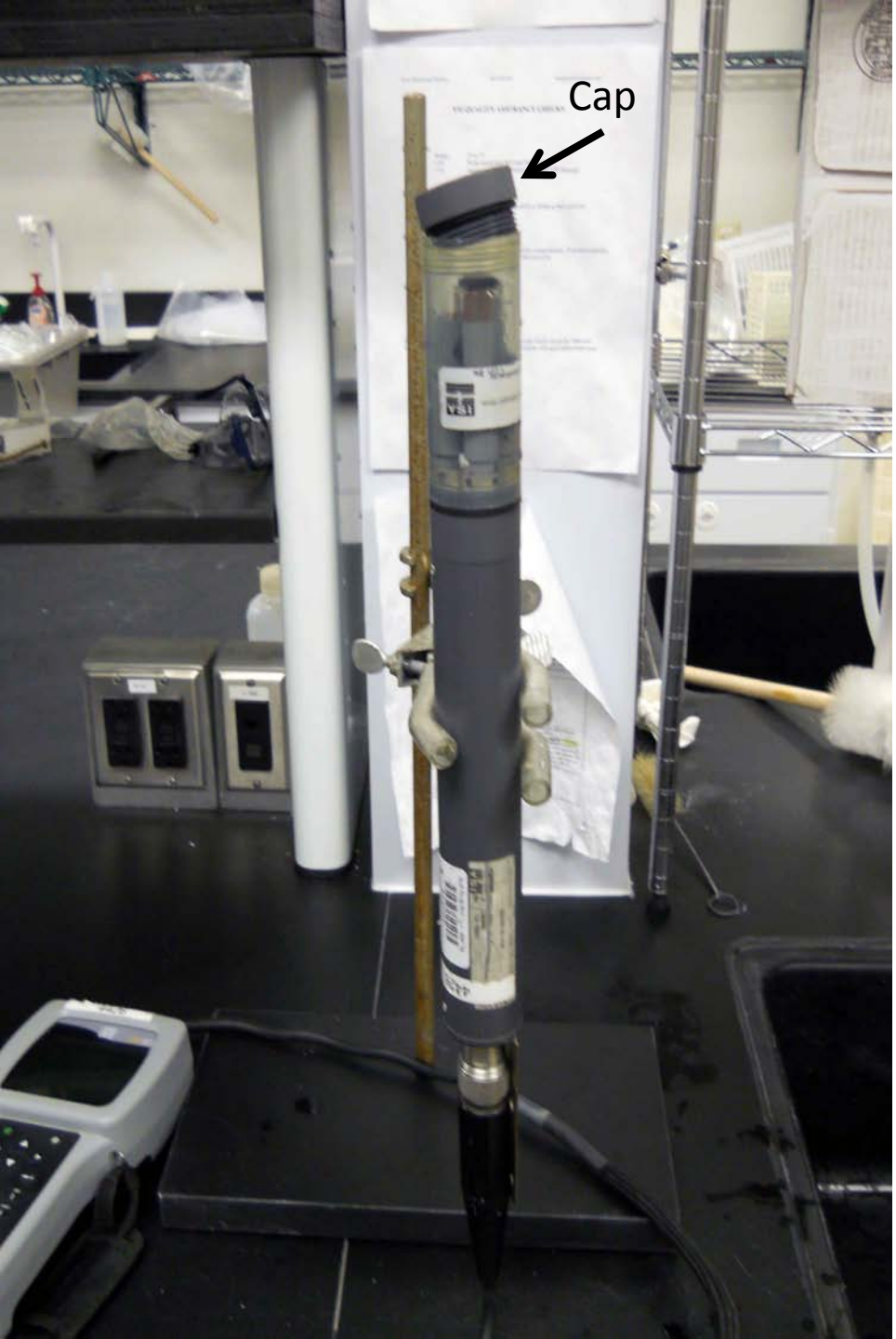
Refer to SFWMD FSQM Section 7.7.2


Rinse probes with AFW, then **rinse** probes with pH 10 (or pH 4) buffer.
Fill cup with that same pH buffer and **calibrate** the instrument for that buffer.
*After the second calibration, **rinse** probes with AFW.*

Rinse probes with room temperature AFW by filling cup and discarding AFW.

Fill cup with a small amount of room temperature AFW.

Room Temperature AFW

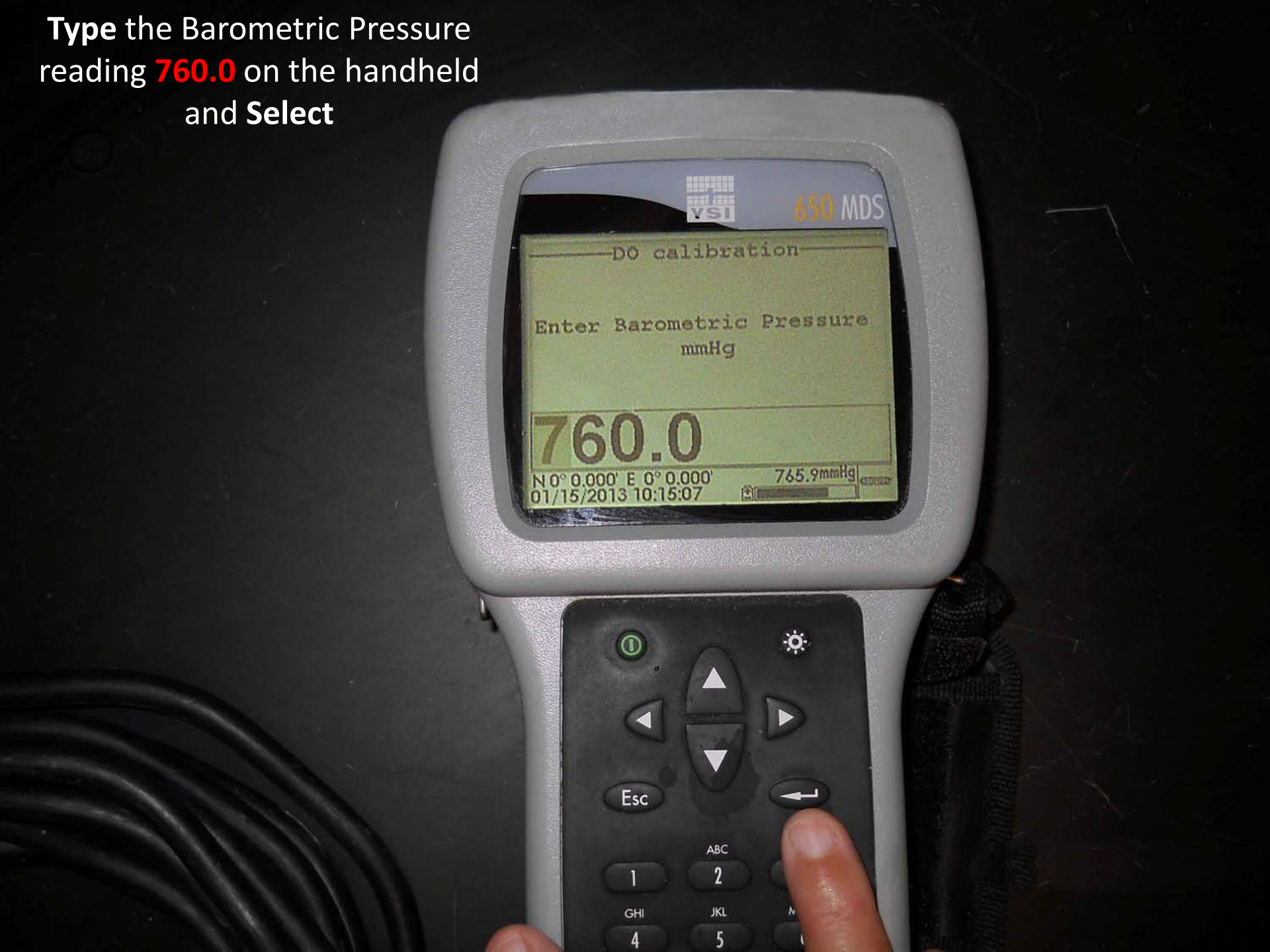


Place cap loosely on the cup
for water-saturated air calibration

Select Dissolved Oxy

Select DO sat %

Type the Barometric Pressure reading **760.0** on the handheld and **Select**



After stabilization, **record** the pre-calibration reading (Dissolved Oxygen in **mg/L**) and **select** calibrate

After calibration, **verify** the True Value of D.O with corresponding Temperature (^{o}C) and the calibrated D.O.

D.O. reading must be within ±0.3 mg/L of water-saturated air of that water temperature

Refer to SFWMD FSQM Section 7.8.1

Dissolved Oxygen (DO) Saturation

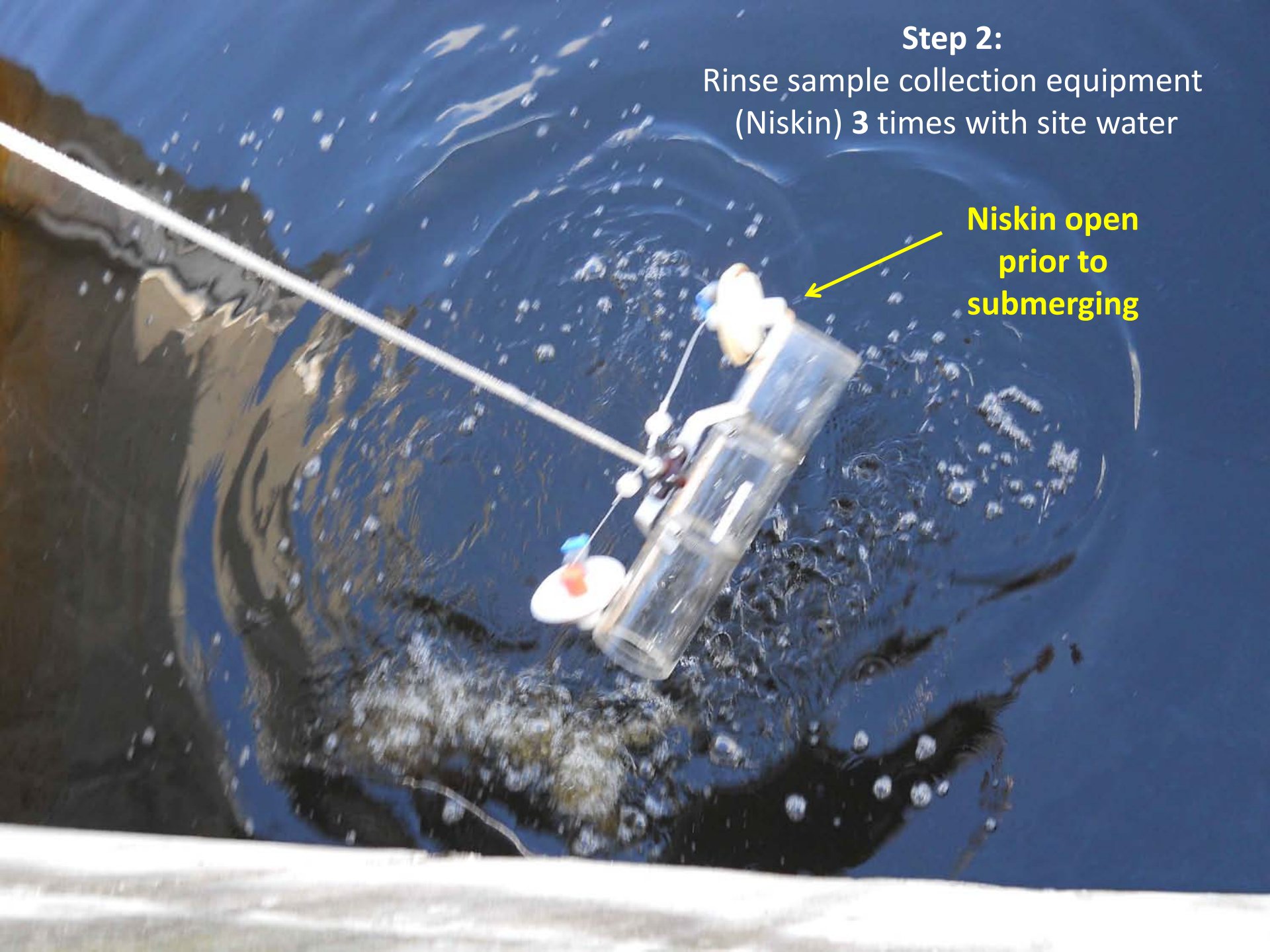
TEMP ^{o}C	D.O. SAT.	TEMP ^{o}C	D.O. SAT.	TEMP ^{o}C	D.O. SAT.	TEMP ^{o}C	D.O. SAT.
15.0	10.084	19.0	9.276	23.0	8.578	27.0	7.968
15.1	10.062	19.1	9.258	23.1	8.562	27.1	7.954
15.2	10.040	19.2	9.239	23.2	8.546	27.2	7.940
15.3	10.019	19.3	9.220	23.3	8.530	27.3	7.926
15.4	9.997	19.4	9.202	23.4	8.514	27.4	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

Store probes with a small amount of tap water to keep probes moist

Surface Water Grab Sampling Guidance

SFWMD FSQM Section 5.2

Step 1:
Put on clean, protective gloves

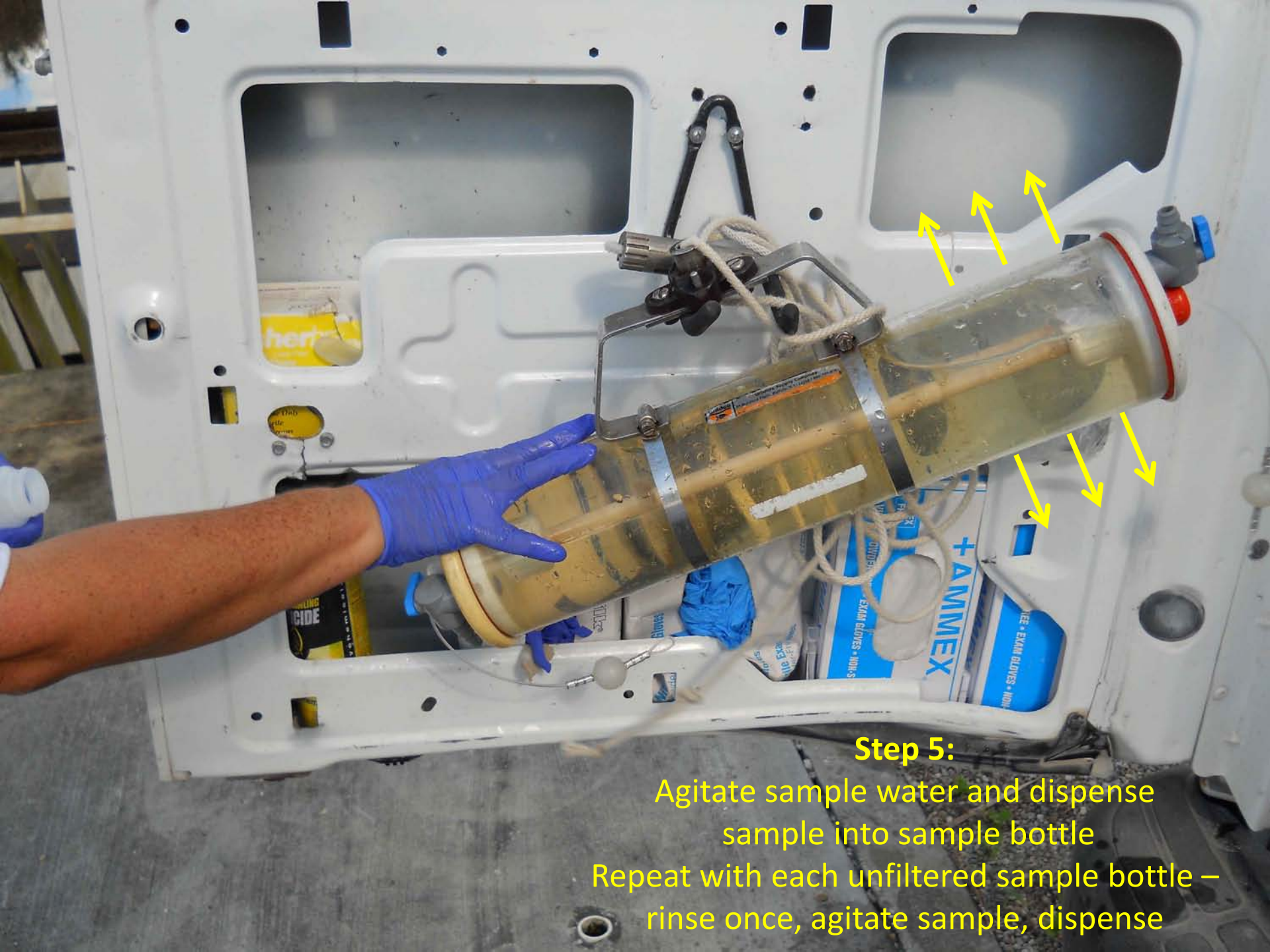

Step 2:
Rinse sample collection equipment (Niskin) 3 times with site water
Niskin open prior to submerging

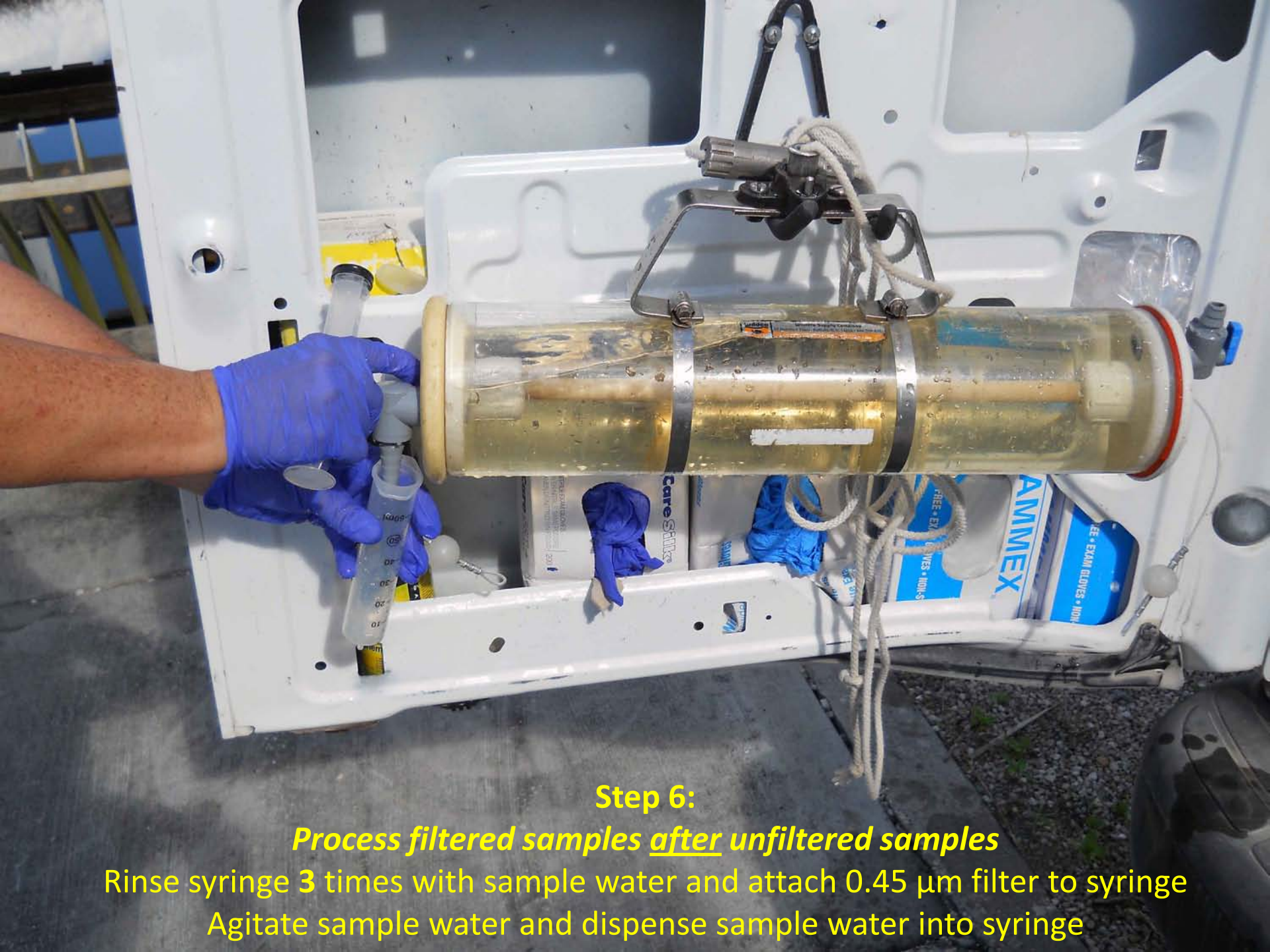

Step 3:
Collect sample at 0.5m depth
(unless otherwise specified)
away from the rinse area
Submerged
Niskin

Step 4:

Process unfiltered samples first.

Each sample bottle must be rinsed 1 time with unfiltered sample water


Step 5:
Agitate sample water and dispense sample into sample bottle
Repeat with each unfiltered sample bottle – rinse once, agitate sample, dispense



Step 6:

Process filtered samples <u>after</u> unfiltered samples

Rinse syringe **3** times with sample water and attach 0.45 µm filter to syringe

Agitate sample water and dispense sample water into syringe


Step 7:
Rinse filter with a minimum of 30 mL of sample water
Discard rinsate

Step 8:
Sample bottles must be rinsed one **(1)** time with filtered sample water

Step 9:

Agitate sample water and dispense sample into syringe

Filter sample into sample bottles

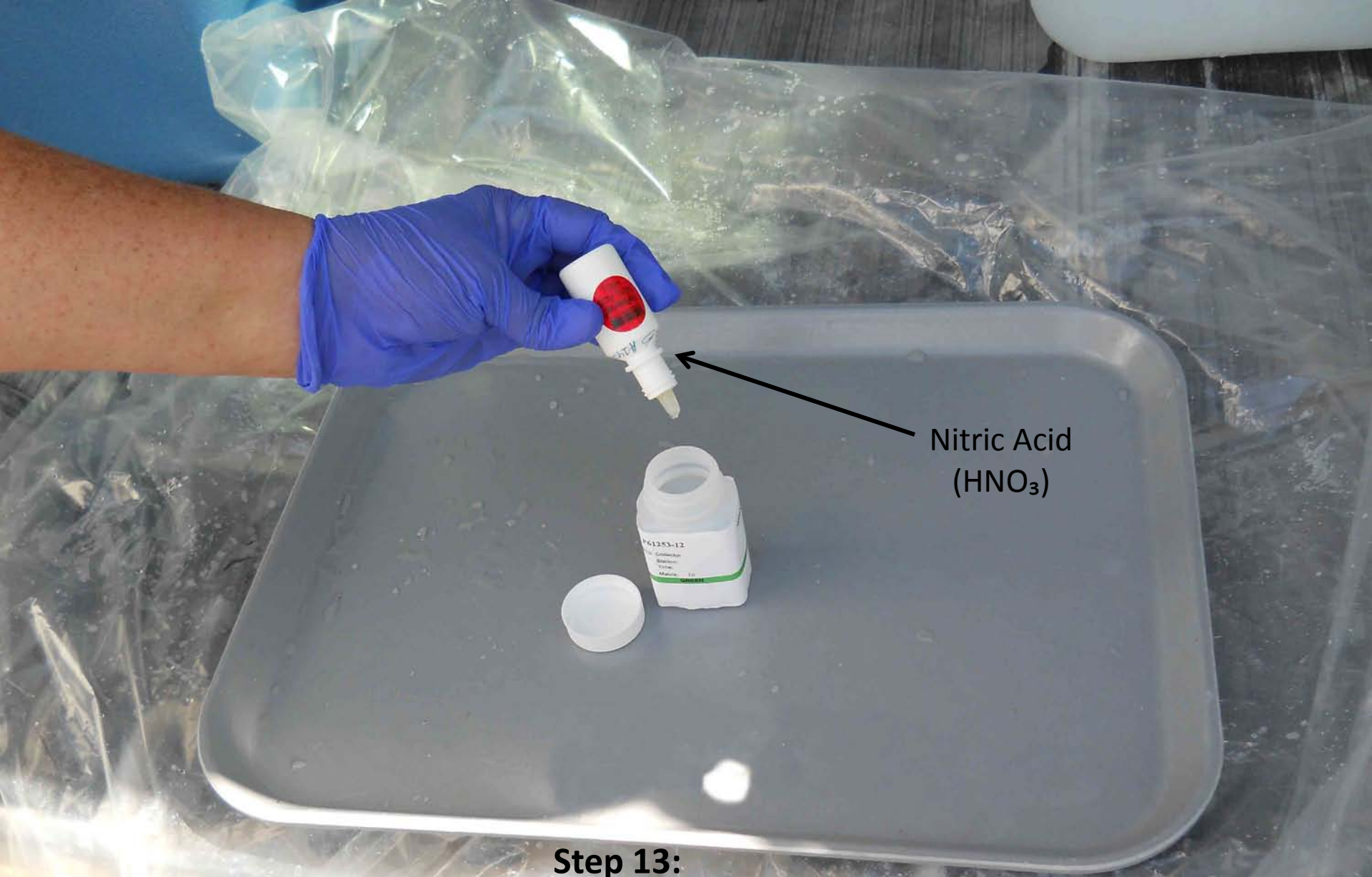
Step 10:
Place sample bottle(s) not requiring acid preservation into a cooler in ice

Step 11:
Acid Preservation
Acidify unfiltered and filtered sample bottle(s) requiring **H_2SO_4**

Step 12:

Check for proper pH between 1.3 and 2.0 units

Place **H_2SO_4** acidified samples into a cooler in ice



Step 13:

Acidify unfiltered and filtered sample bottles requiring **HNO_3**

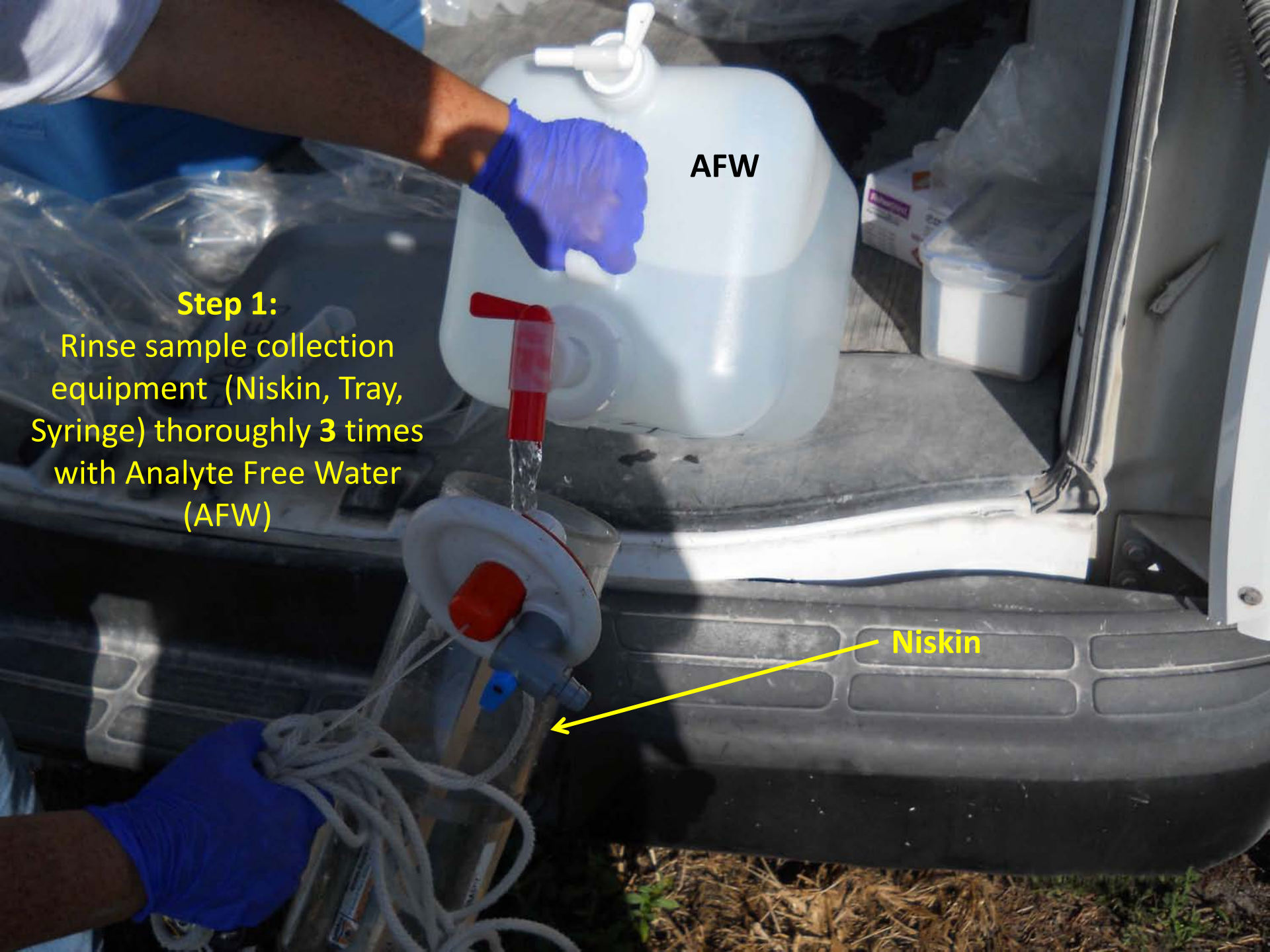
Check for proper pH between 1.3 and 2.0 units

Place **HNO_3** acidified samples into a cooler in ice

Step 14:
Proceed to
Field Equipment Cleaning

Field Equipment Decontamination Guidance

SFWMD FSQM Section 4.3 & 5.2.4



Step 1:
Rinse sample collection equipment (Niskin, Tray, Syringe) thoroughly **3** times with Analyte Free Water (AFW)


Step 2:
Place sample collection equipment into/on a clean plastic bag


Step 3:
Rinse sampling tray
3 times with AFW


Step 4:
Place sampling tray
into clean bag

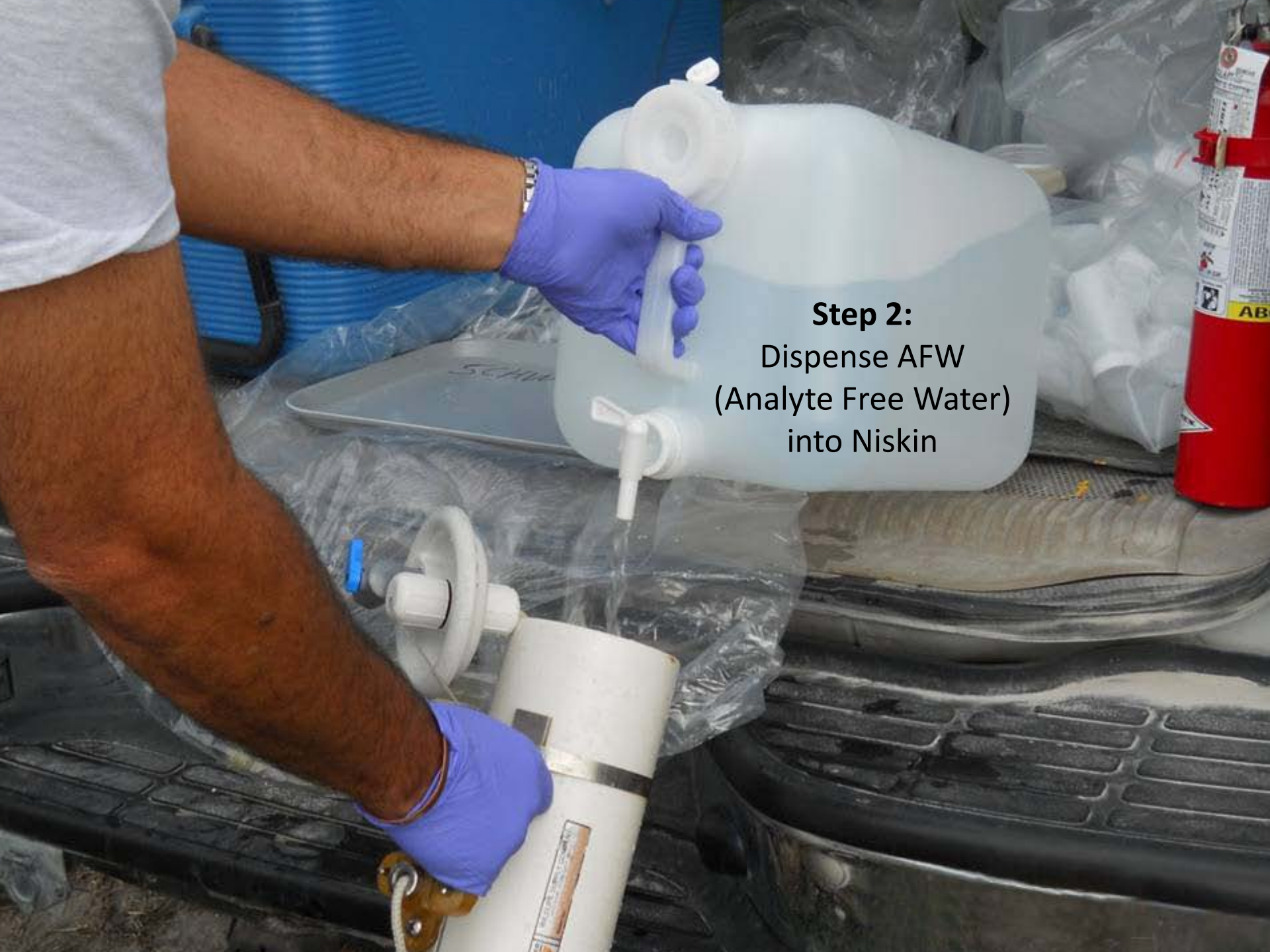

Step 5:
Rinse syringe 3 times with AFW. Place all cleaned sampling equipment into clean bag(s). Securely seal the bag(s).
STIMPY

Remove and discard gloves

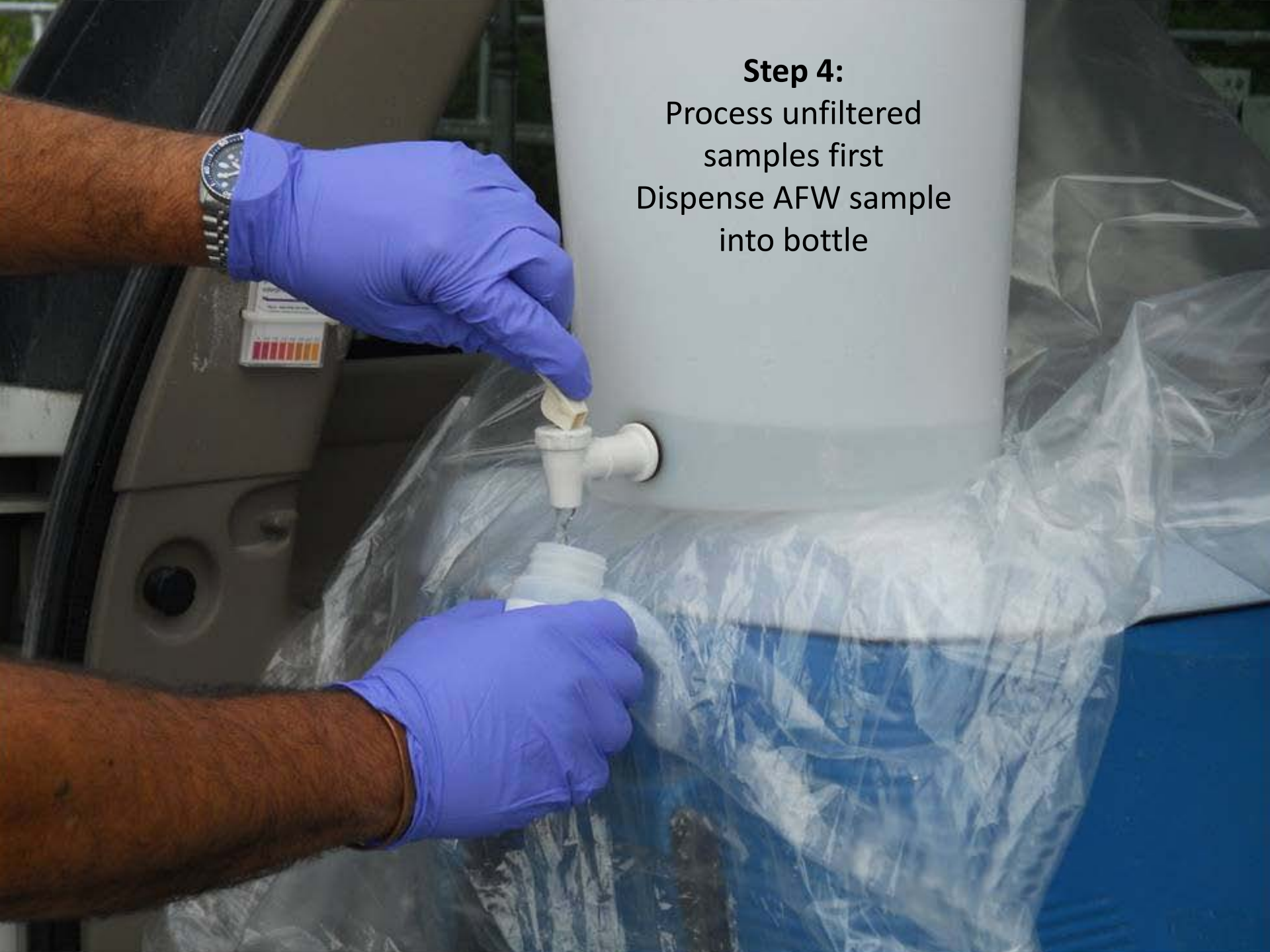
Processing
Field Cleaned Equipment Blank
(FCEB)
for Surface Water Grab

SFWMD FSQM Section 9.1.2


Step 1:
Put on clean,
protective gloves


Step 2:
Dispense AFW
(Analyte Free Water)
into Niskin

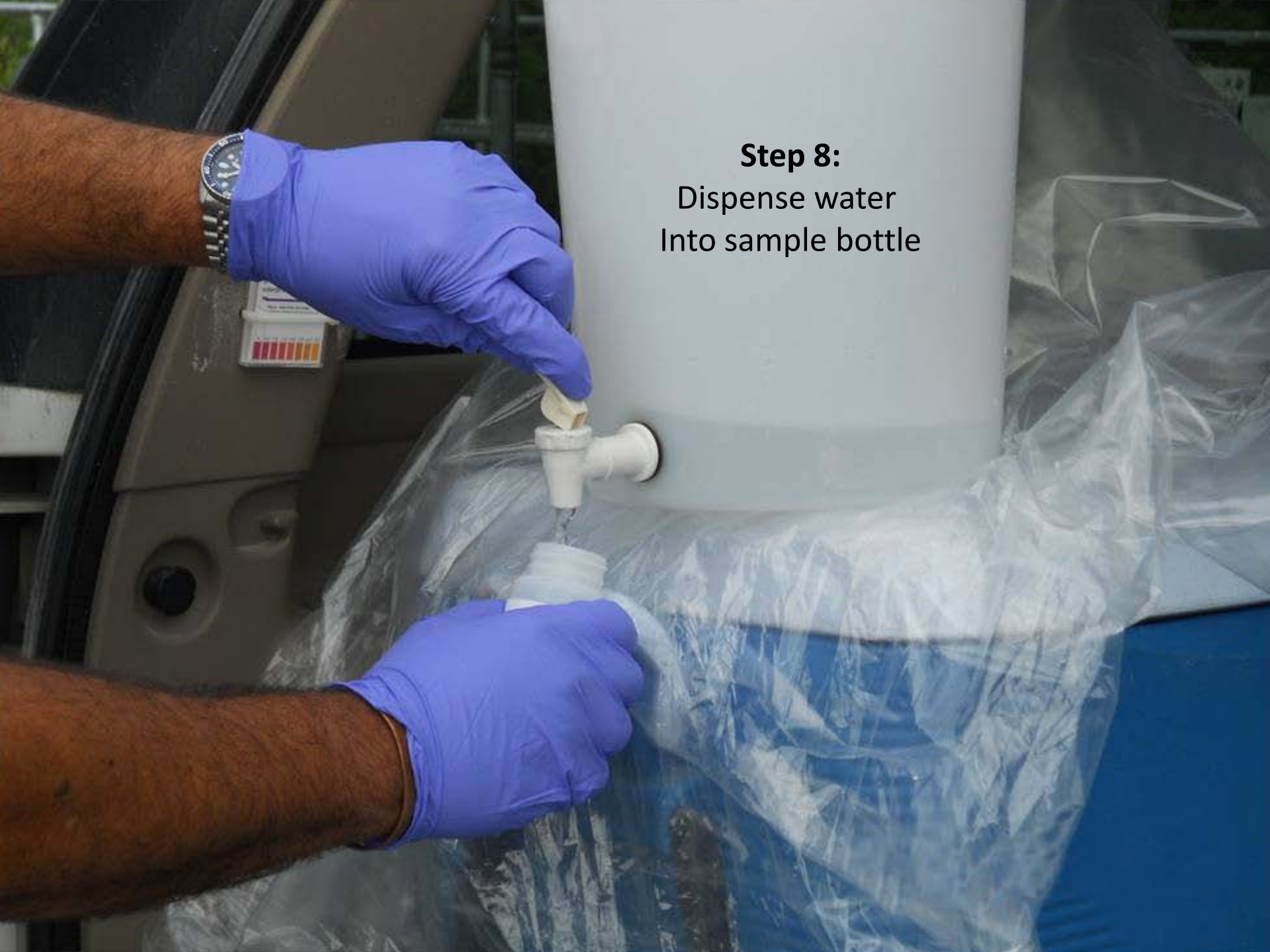
Step 3:
Dispense AFW from Niskin into bucket


Step 4:
Process unfiltered samples first
Dispense AFW sample into bottle


Step 5:
Mix to rinse bottle one (**1**)
time with AFW sample

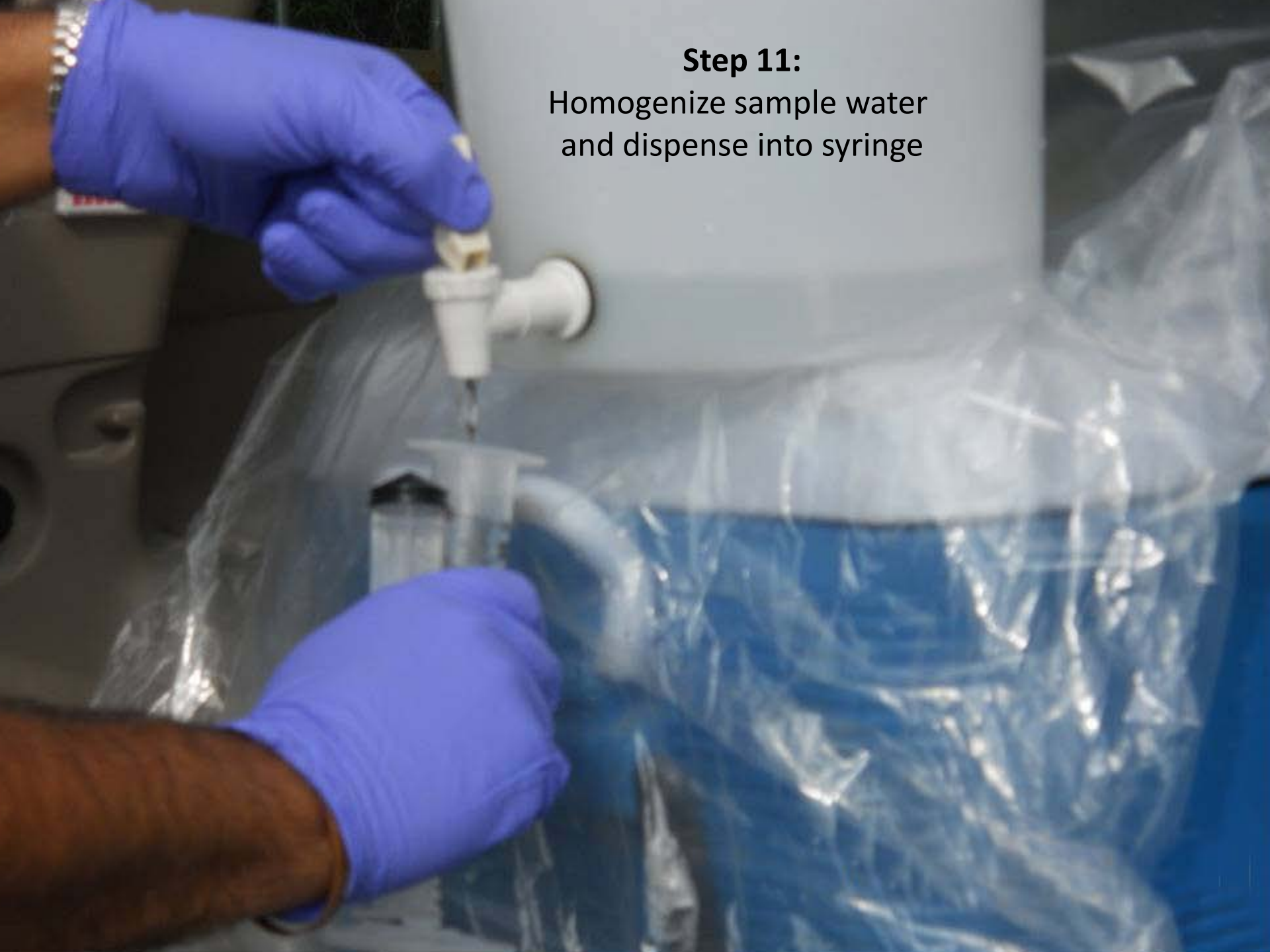
Step 6:
Discard rinsate

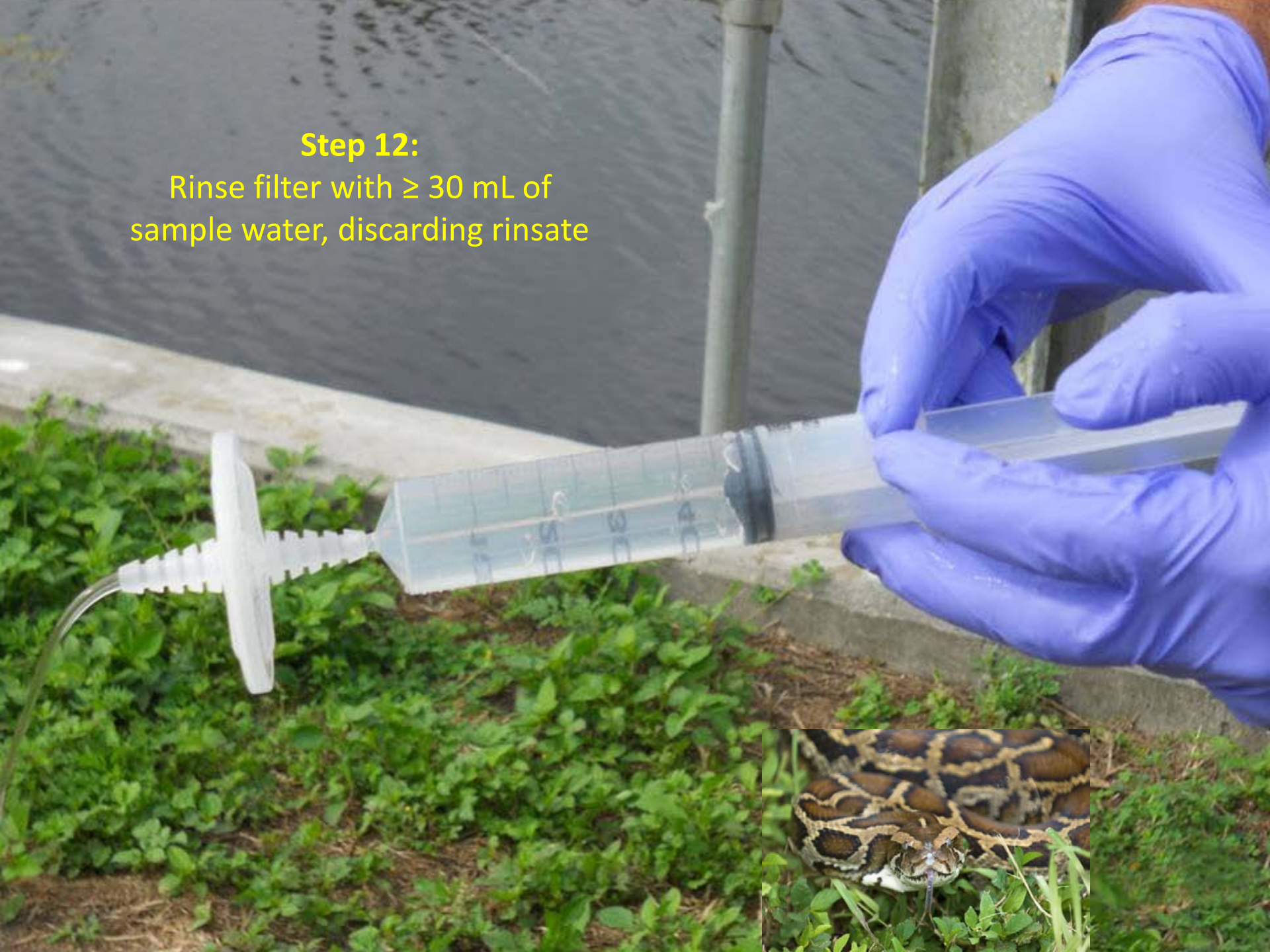
Step 7:
Homogenize sample


Step 8:
Dispense water
Into sample bottle

Step 9:
Process filtered samples before acidification


Step 10:
Attach 0.45 µm filter device to syringe

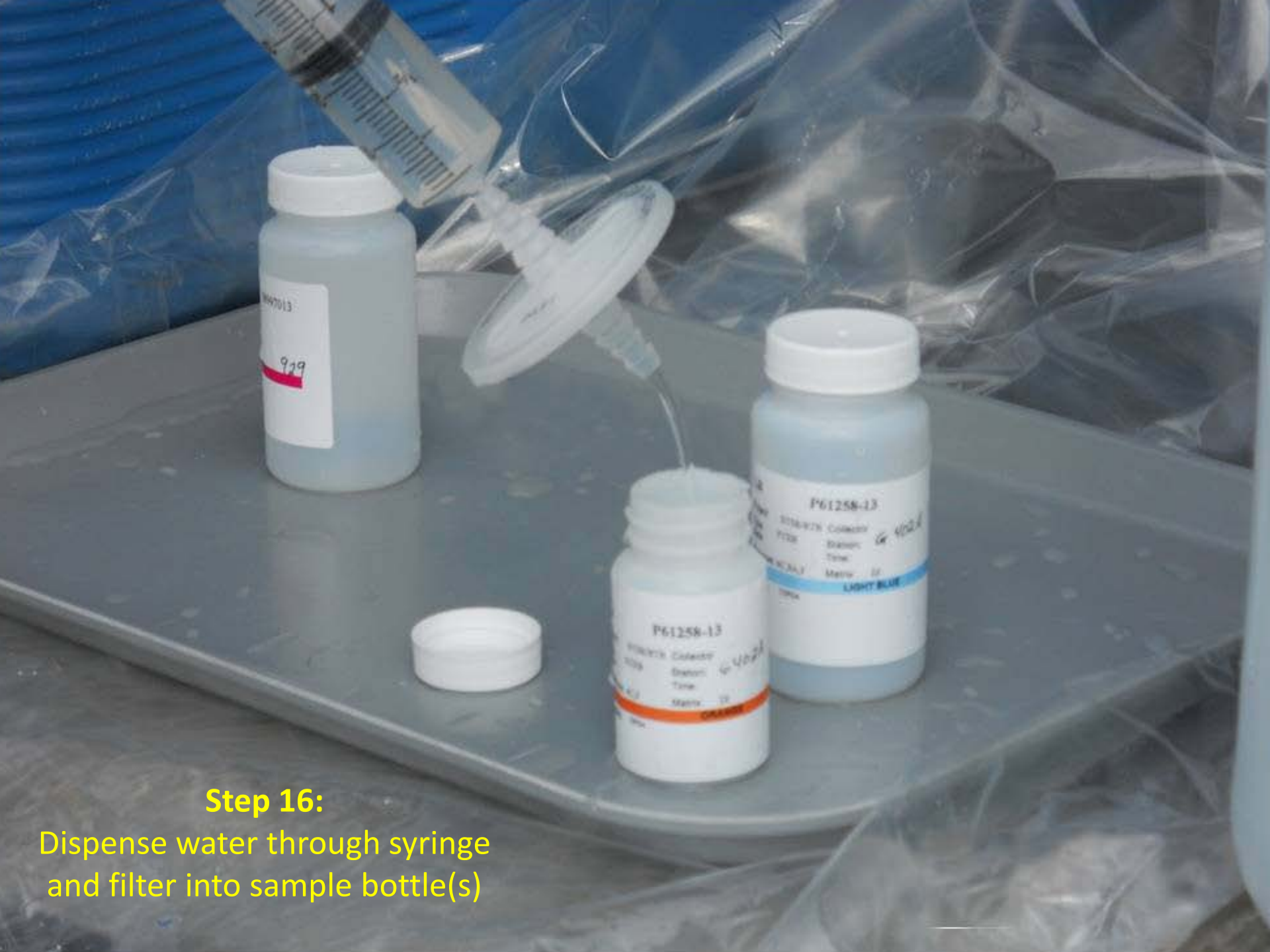

Step 11:
Homogenize sample water
and dispense into syringe


Step 12:
Rinse filter with ≥ 30 mL of
sample water, discarding rinsate

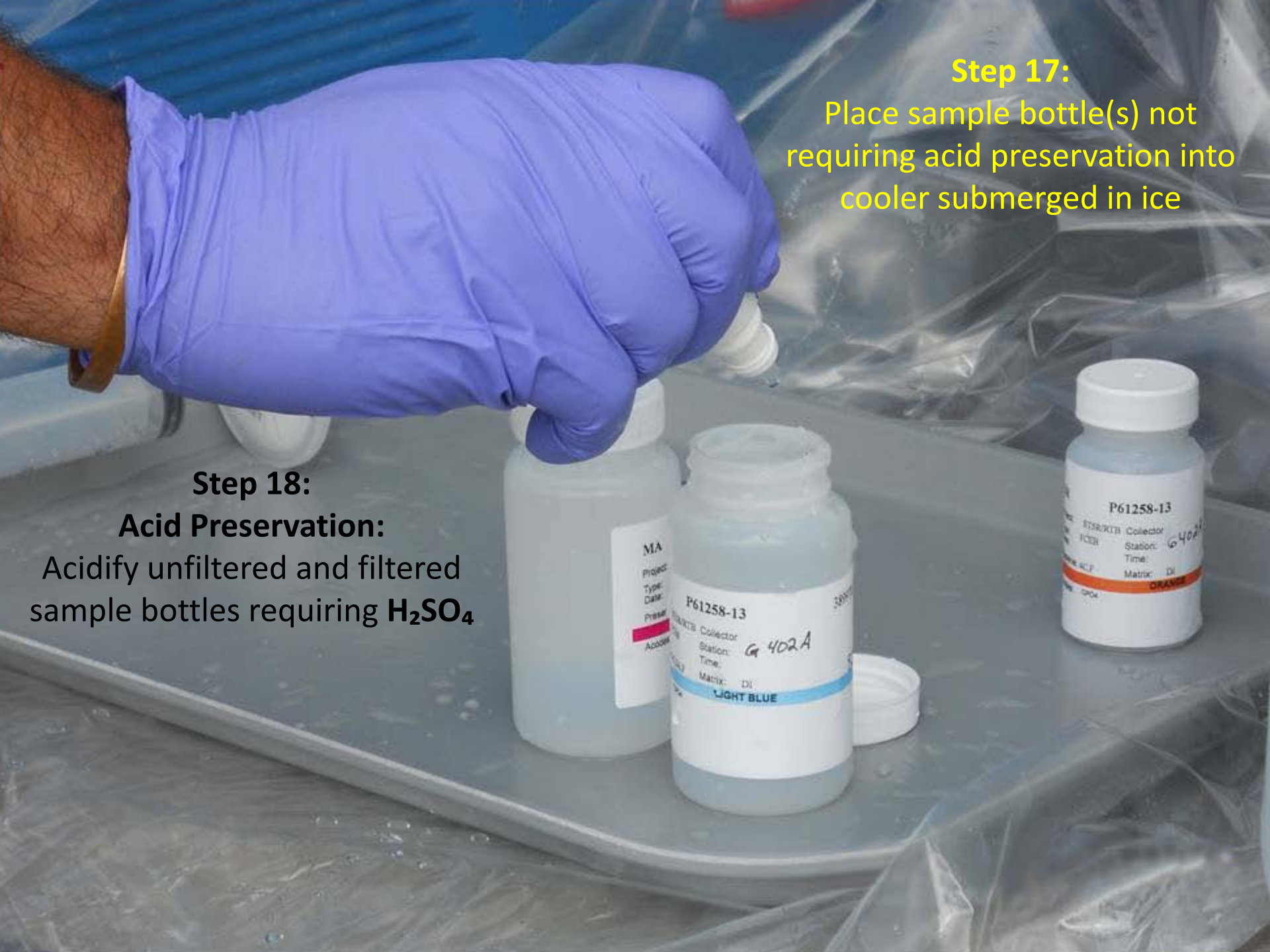
Step 13:
Dispense water through syringe and filter into sample bottle


Step 14:
Rinse bottle one (**1**)
time with rinsate


Step 15:
Discard rinsate



Step 16:
Dispense water through syringe and filter into sample bottle(s)



Step 17:
Place sample bottle(s) not requiring acid preservation into cooler submerged in ice

Step 18:
Acid Preservation:
Acidify unfiltered and filtered sample bottles requiring **H_2SO_4**

Step 19:

Check for proper pH between 1.3 and 2.0 units

Place **H_2SO_4** acidified samples into cooler in ice

Non-acidified and H_2SO_4 acidified bottles in cooler in ice

Step 20:

Acidify unfiltered and filtered sample bottles requiring **HNO_3**

Check for proper pH between 1.3 and 2.0 units

Place **HNO_3** acidified samples into cooler

Field Equipment Decontamination Guidance

After the field trip

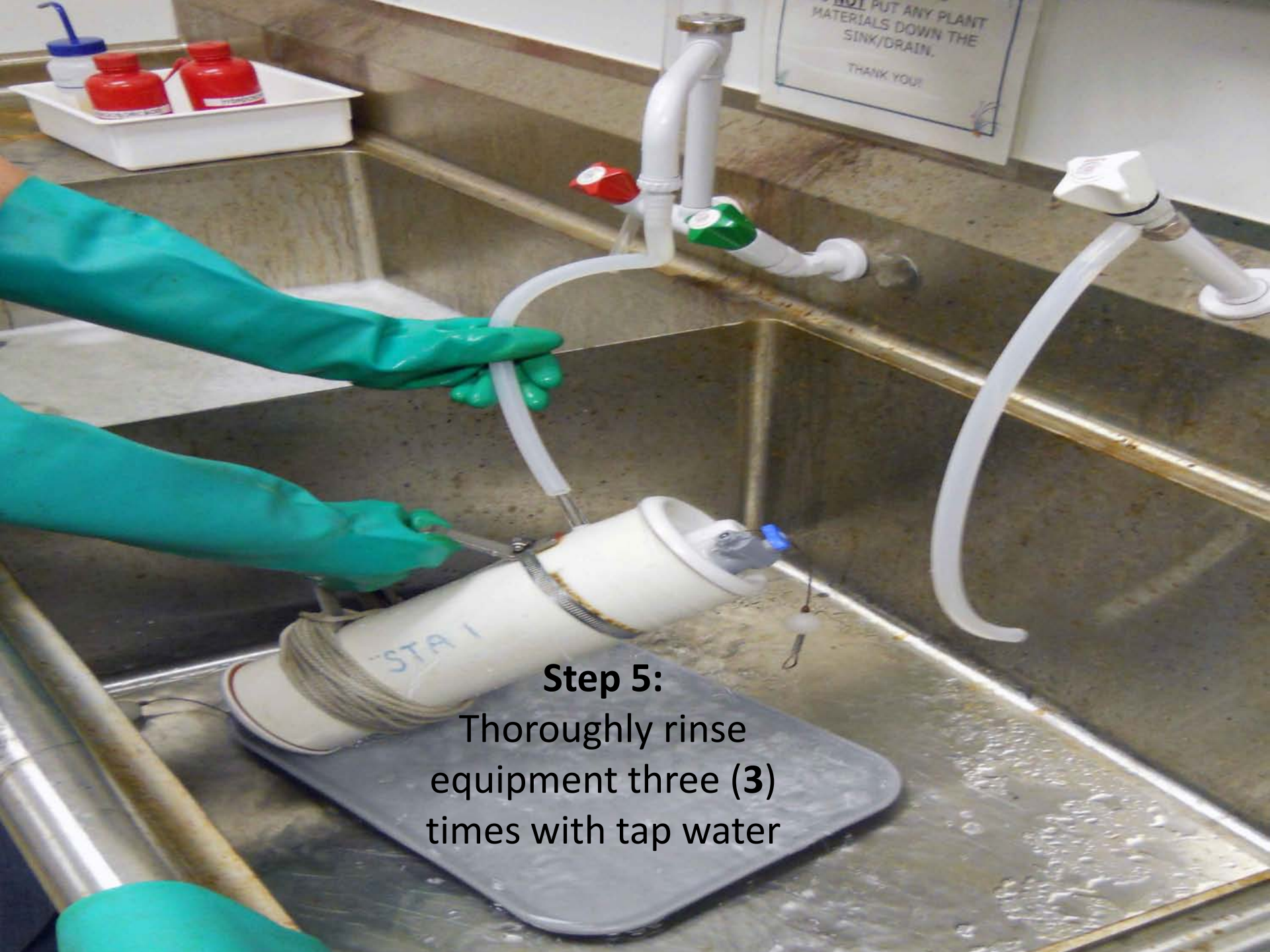
SFWMD FSQM Section 4.2


Step 1:
Put on clean,
protective gloves

Step 2:
Add Liquinox to water to make a soapy solution bath.

Step 3:
Soak field equipment in soapy solution bath

Step 4:
Remove any heavy debris from equipment with brush



Step 5:
Thoroughly rinse equipment three (**3**) times with tap water

Step 6:
Thoroughly cover all surfaces with **HCl** acid

Step 7:
Rinse equipment three (**3**) times with Analyte-Free Water (AFW)

Step 8:

Air dry equipment in a clean, designated equipment drying area. Record the equipment ID into the equipment cleaning logbook.

Autosampler

(Pre-Acidified; 24 discrete bottles)

#*, # BOTTLE #*** AFTER # PULSES**

#* = the number of the *next sample to be collected*

#** = number of samples collected per bottle

BOTTLE #* =** the bottle into which the next sample will be collected

AFTER # PULSES = the set number of pulses needed for the autosampler to initiate a sample.

Step 1:
Determine number of samples.
(e.g. 51 samples)


Step 2:
Stop program.
RUN "EXTENDED 1"
PROGRAM
VIEW REPORT
OTHER FUNCTIONS
6712
ISCO
South Florida Water Mgmt - Asset Tag
402132
S/N Z03H02133

Step 3:

Obtain First Sample Trigger (FST) time/date.

(SFWMD FSQM Section 6.2)


Step 4:
Put on clean,
protective gloves.
ISCO
148


Step 5:
Rinse sample processing bucket 3 times with site water using autosampler's manual pump forward function to obtain site water for each rinse.
Note: after rinsing the processing bucket, pump reverse must be used to clear the tubing of site water
14


Step 6:
Disassemble autosampler to retrieve discrete bottles from the tub.
ISCO
148
3 – digit WQM #

Step 7:

Cap autosampler discrete bottles containing samples.

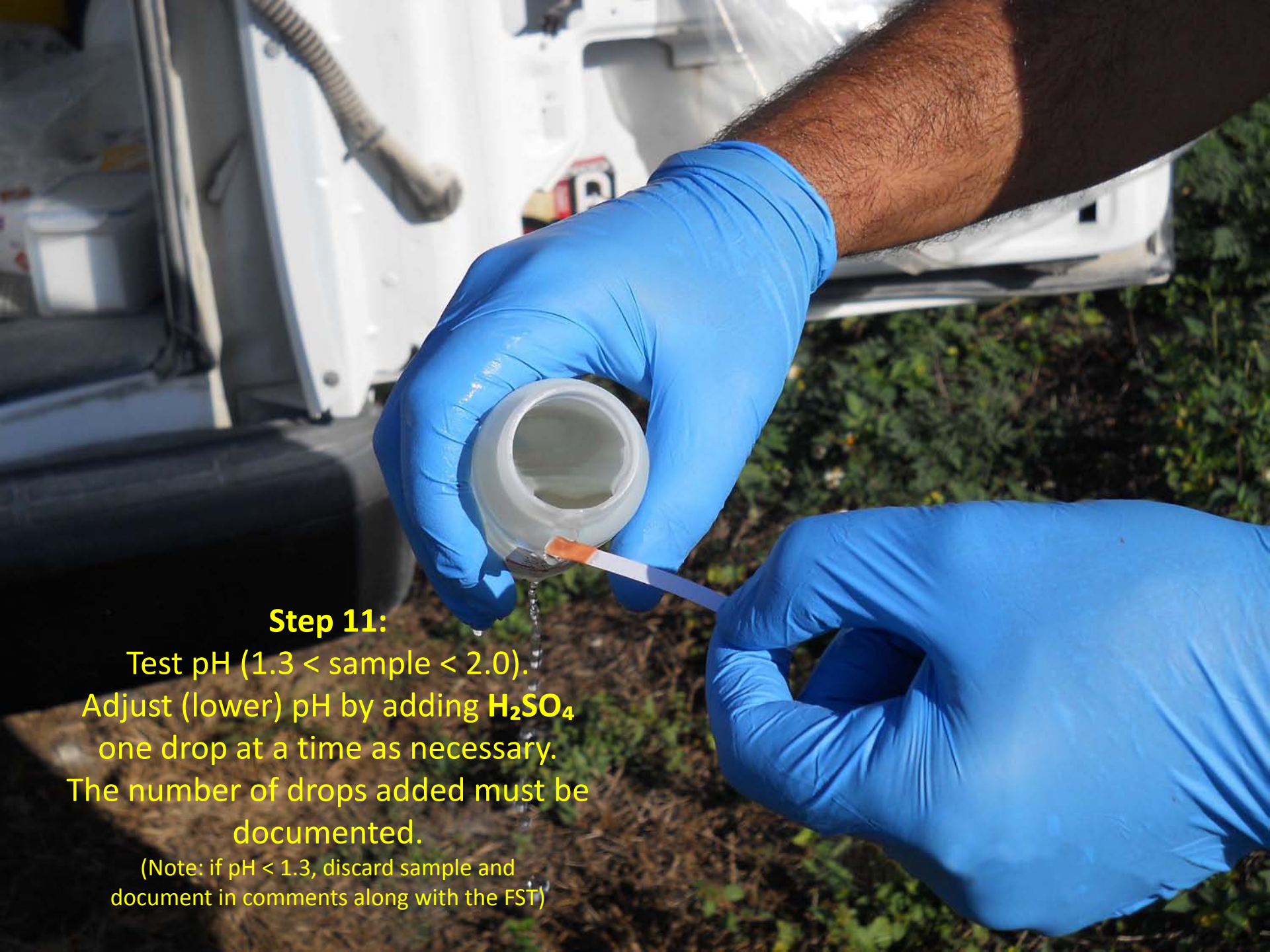
(SFWMD FSQM Section 6.3)

Step 8:
Thoroughly mix sample by inverting each discrete bottle multiple times and dispensing sample water into processing bucket.
(SFWMD FSQM Section 6.3)


Step 9:
Homogenize the composited sample water.

Step 10:
Rinse sample bottle **1** time and discard sample. Dispense sample into sample bottle(s).

Note: no filtering is performed on pre-acidified sample water.



Step 11:

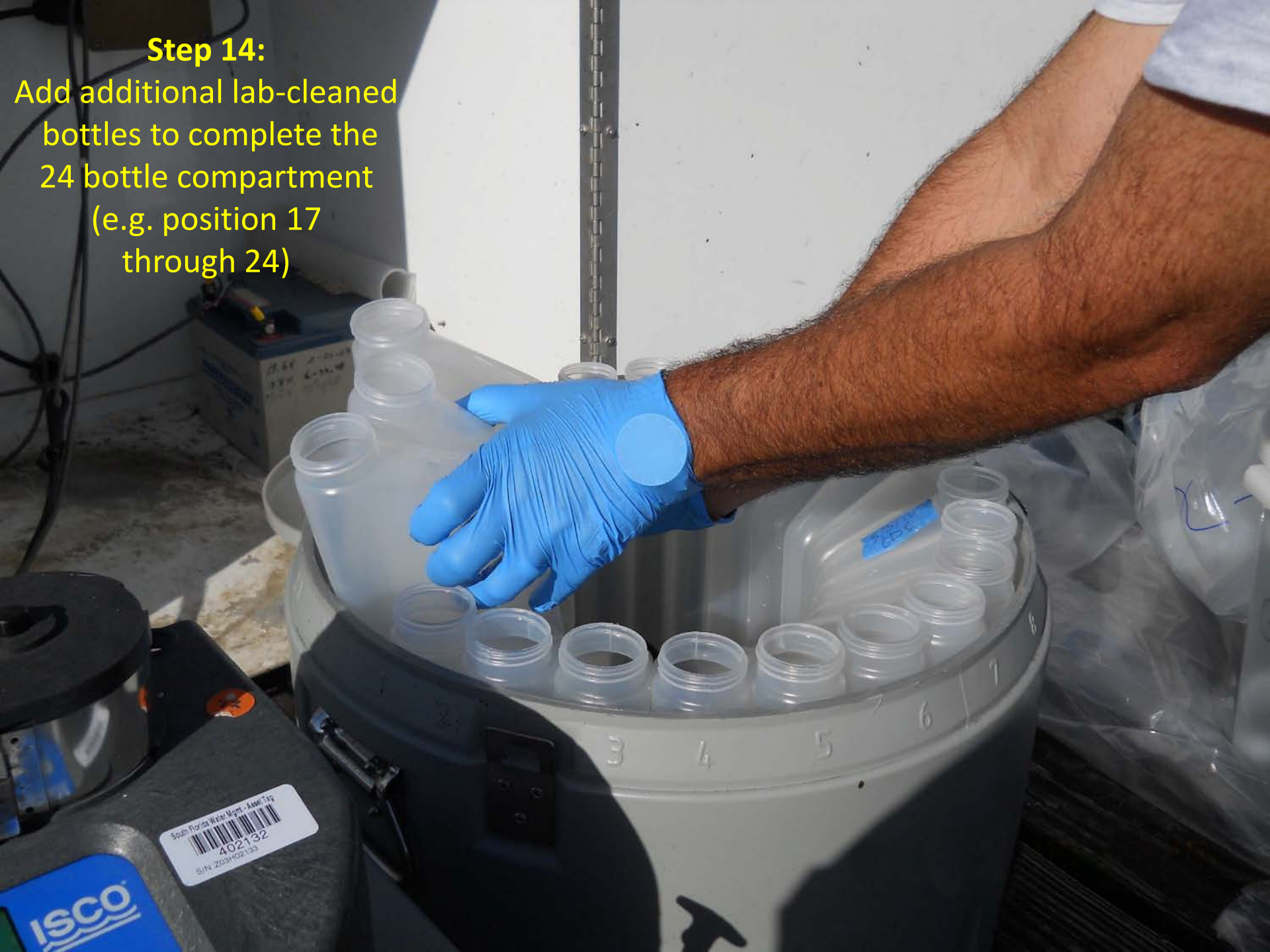
Test pH (1.3 < sample < 2.0).
Adjust (lower) pH by adding **H_2SO_4** one drop at a time as necessary.
The number of drops added must be documented.

(Note: if pH < 1.3, discard sample and document in comments along with the FST)


Step 12:
Store sample bottles in cooler
submerged in ice


Position # 1
Step 13:
Rotate unused preserved discrete bottles within the autosampler tub to position # 1

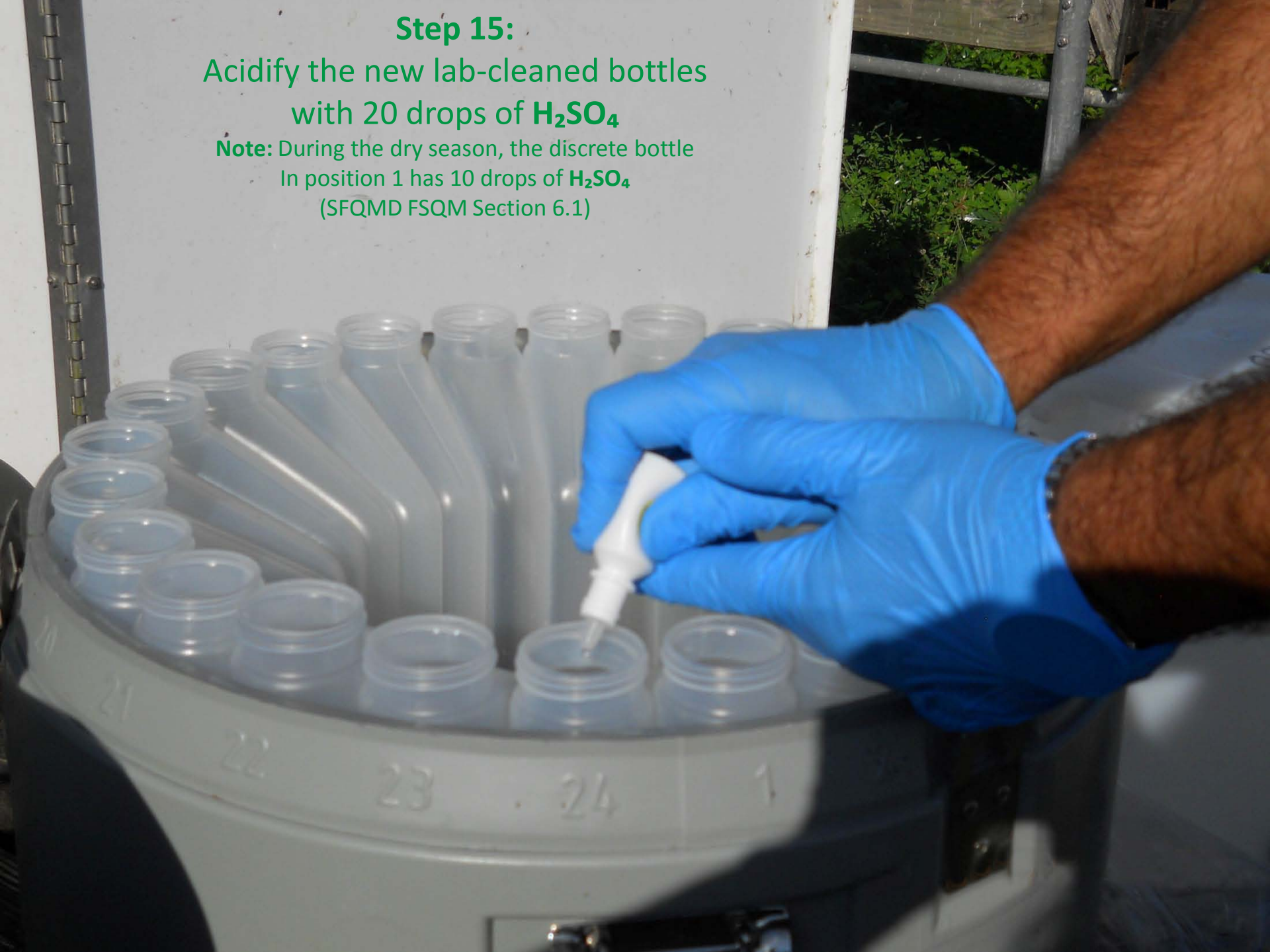
Step 14:
Add additional lab-cleaned bottles to complete the 24 bottle compartment (e.g. position 17 through 24)



Step 15:

Acidify the new lab-cleaned bottles with 20 drops of H_2SO_4

Note: During the dry season, the discrete bottle In position 1 has 10 drops of H_2SO_4 (SFQMD FSQM Section 6.1)




Step 16:
Reassemble autosampler.
Perform calibration check,
using manual
grab sample function
(accept +/- 10% volume)
(SFQMD FSQM Section 6.6 & 6.9.2)
14

Step 17:

Recalibrate and recheck grab sample volume, **if** it exceeds +/- 10% volume

Step 18:

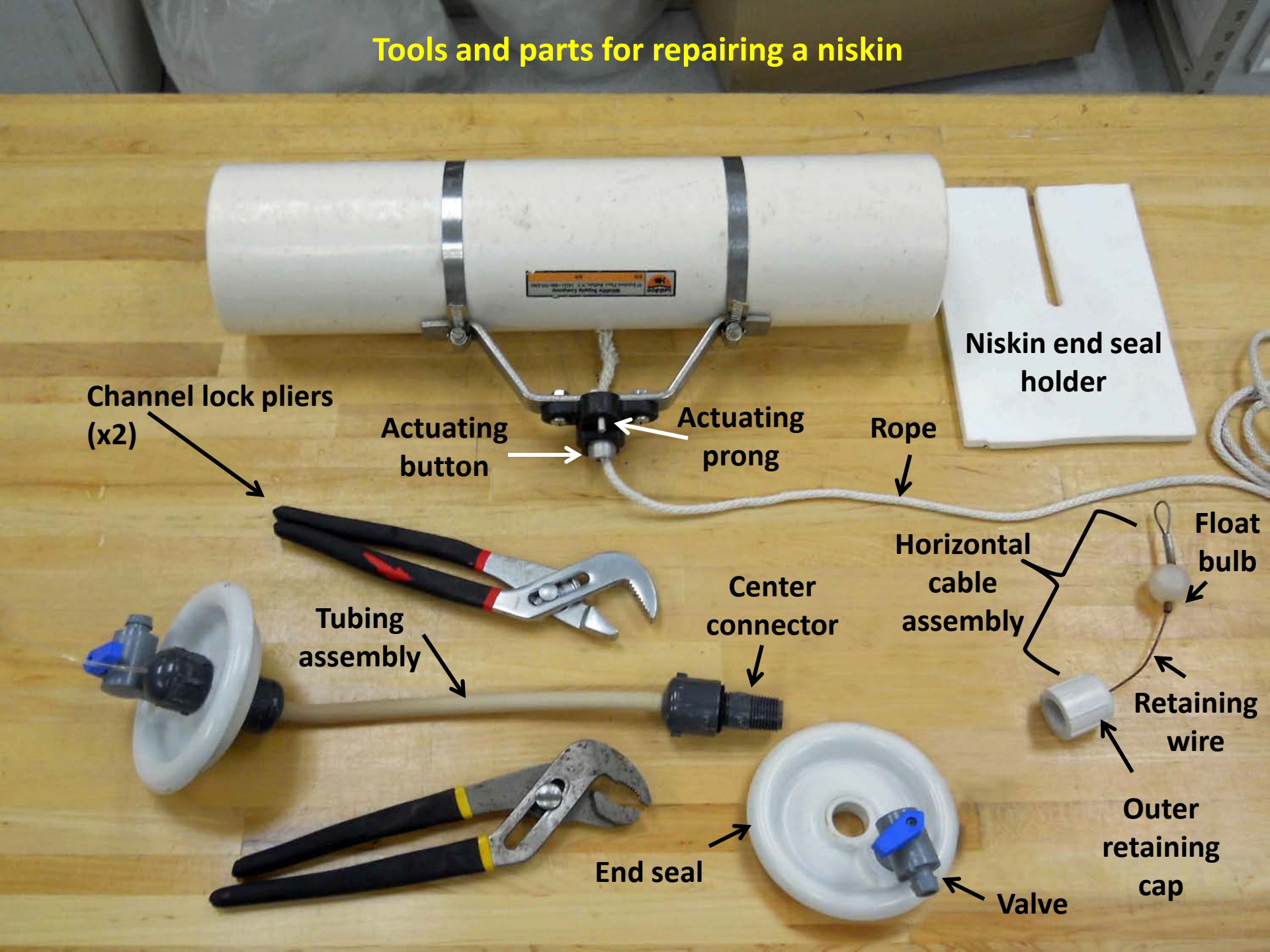
Restart autosampler; press **enter**

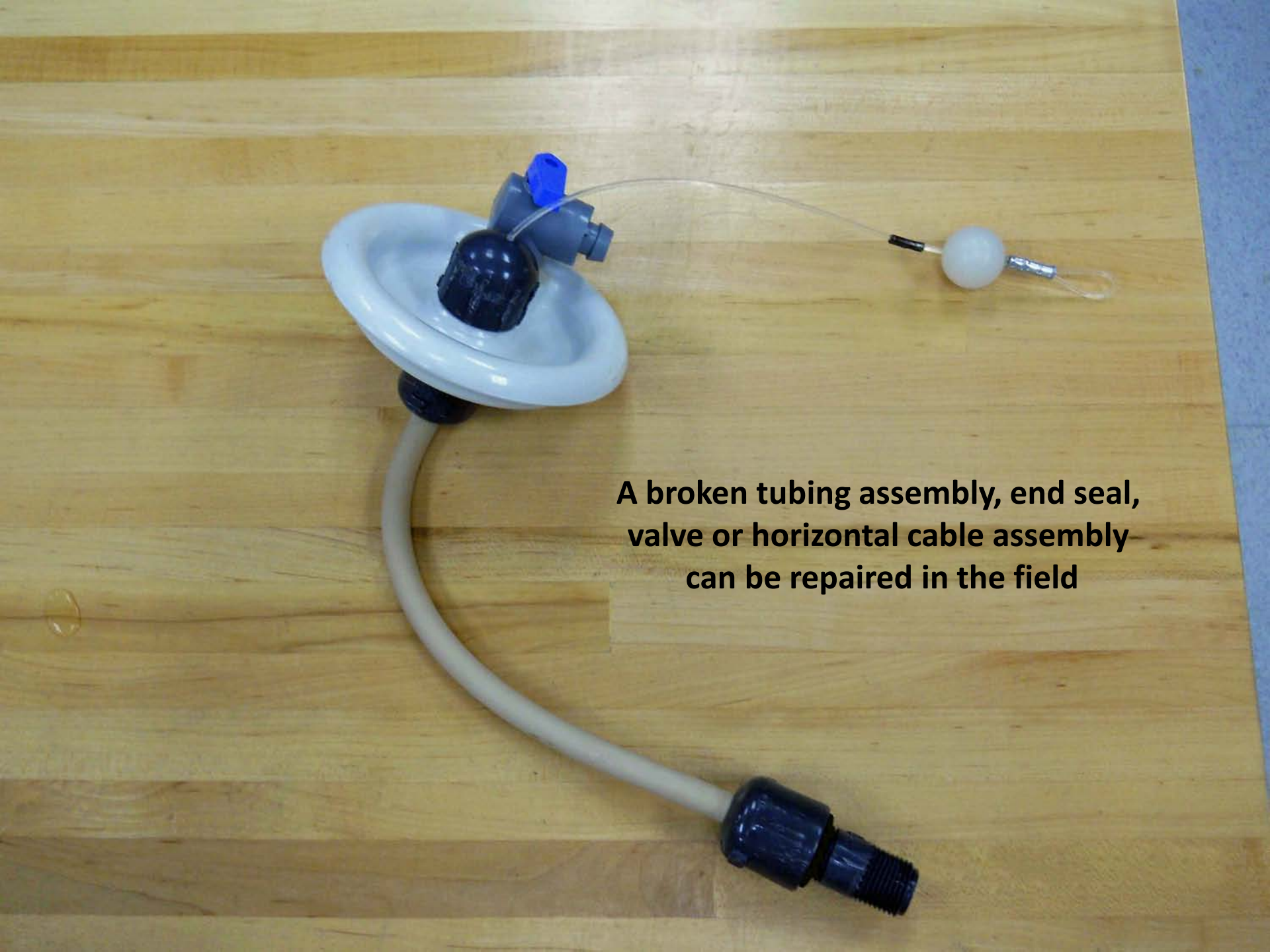
Autosampler restarted

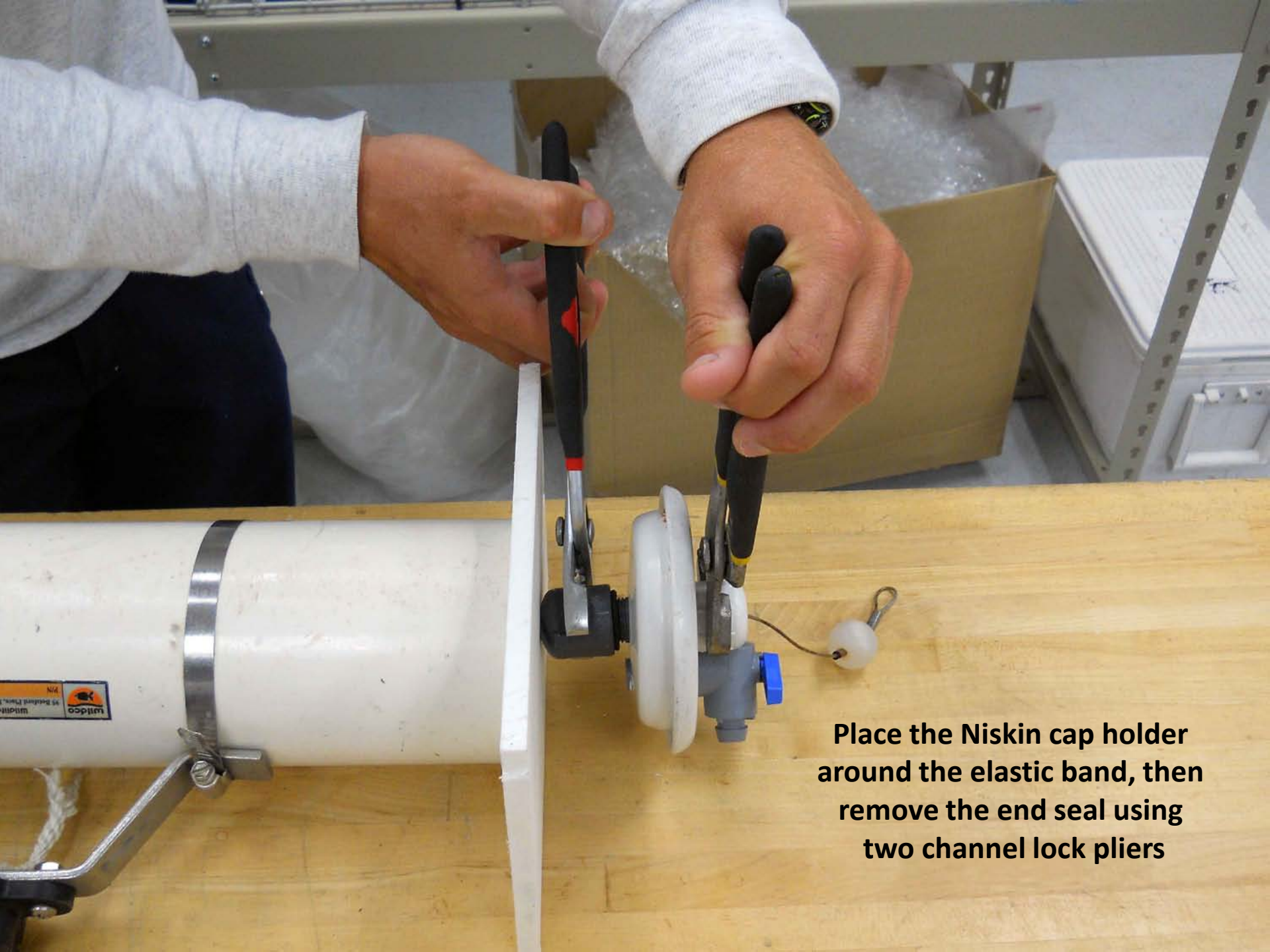
Repairing a Niskin

How to repair a niskin when it breaks

Tools and parts for repairing a niskin




A broken tubing assembly, end seal, valve or horizontal cable assembly can be repaired in the field

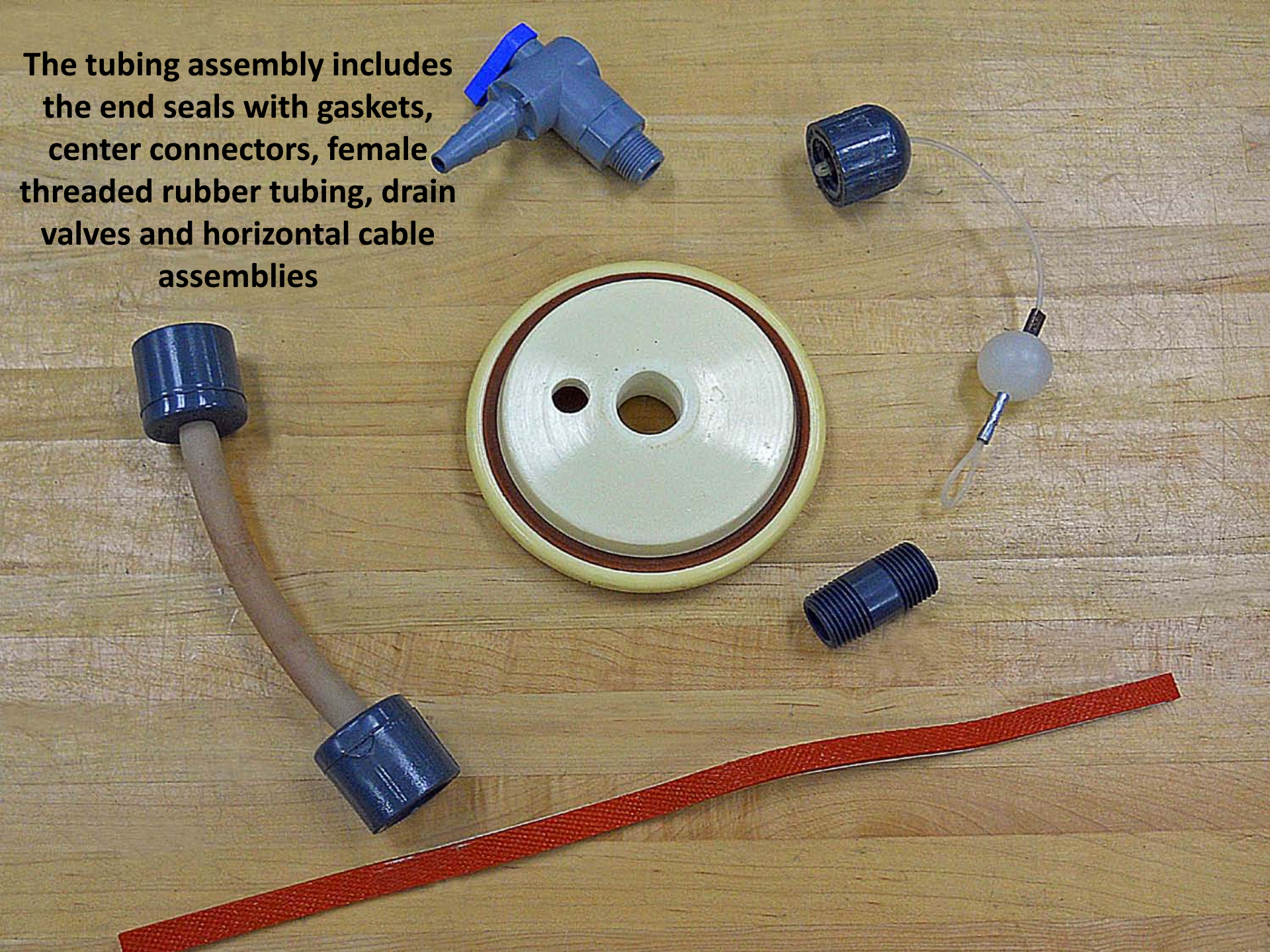


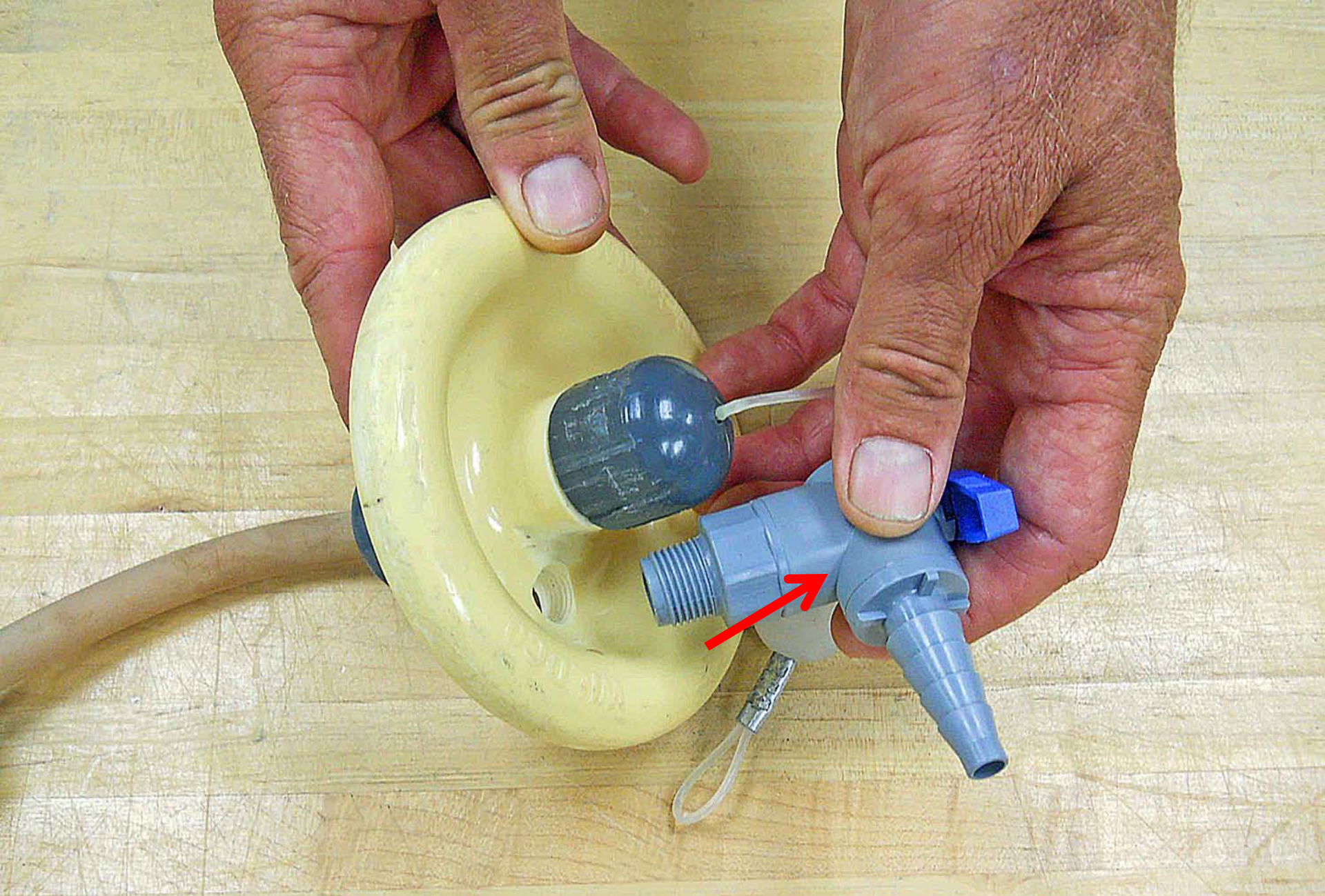
Place the Niskin cap holder around the elastic band, then remove the end seal using two channel lock pliers


Remove / unscrew the
horizontal cable assembly
from the center connector

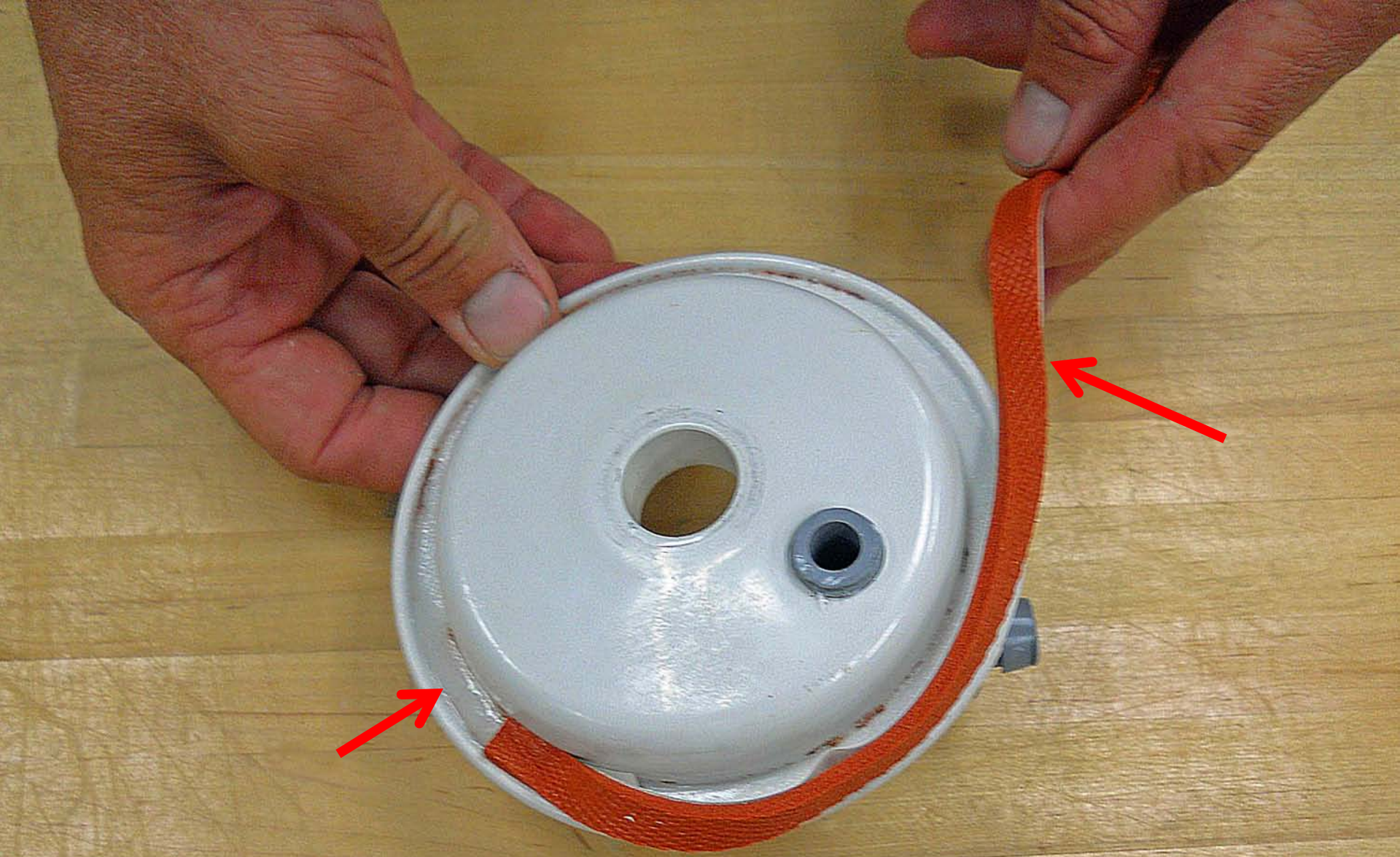

Remove end seal

Replace with new tubing assembly, end seal or horizontal cable assembly


The tubing assembly includes the end seals with gaskets, center connectors, female threaded rubber tubing, drain valves and horizontal cable assemblies



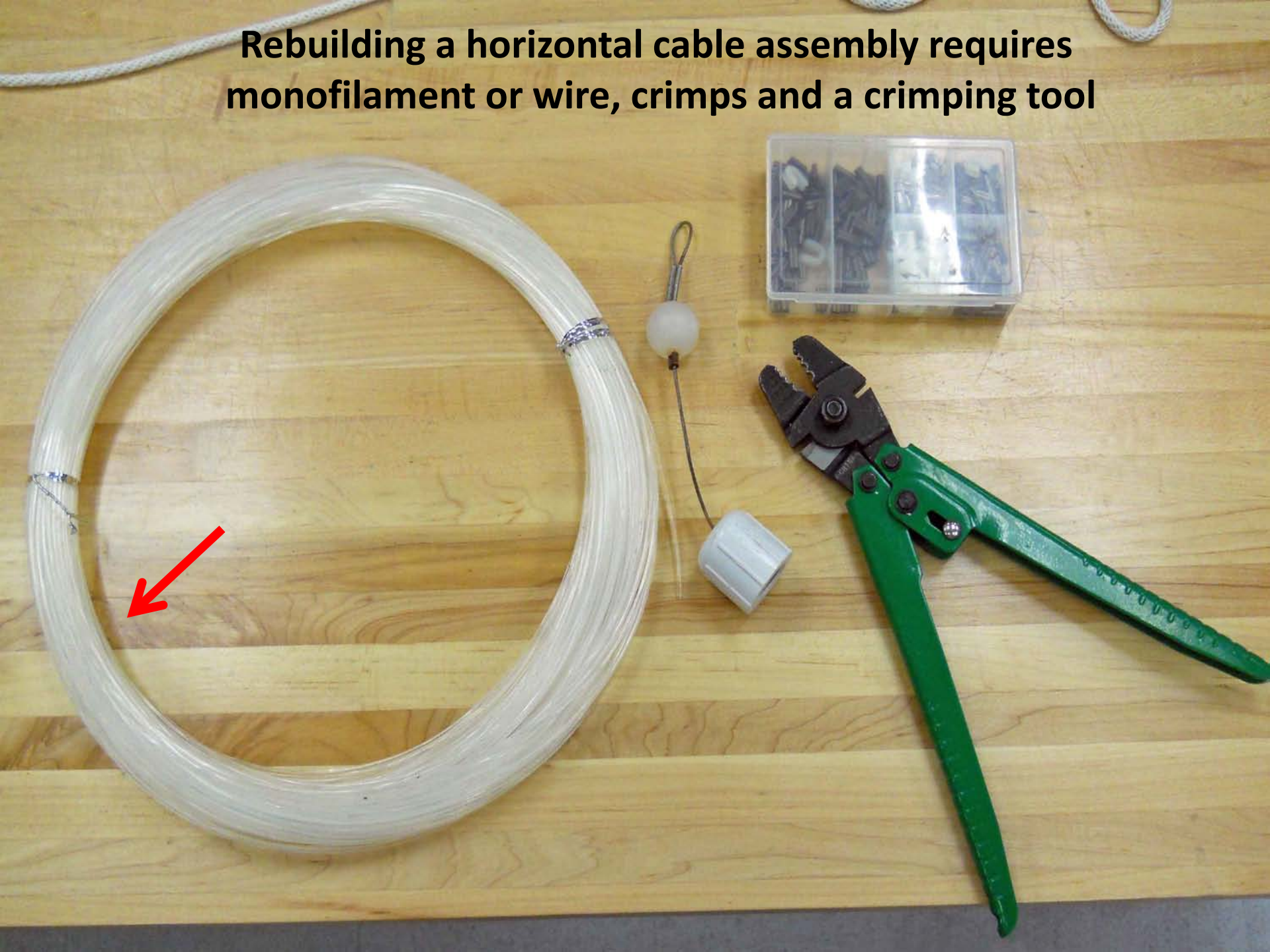
The valve can be replaced if broken



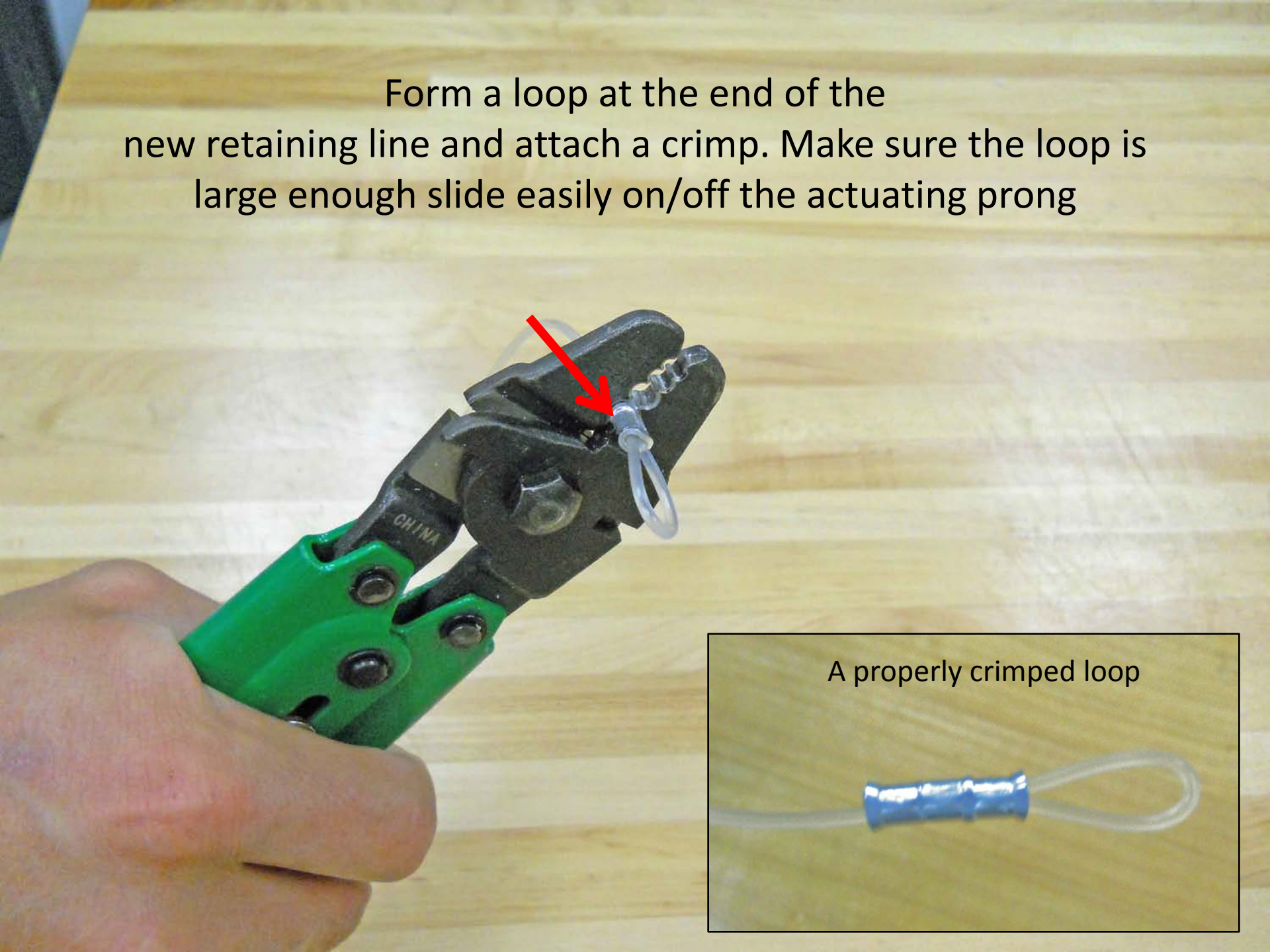
Remove the old gasket and thoroughly clean the cap's perimeter channel before attaching the new gasket.

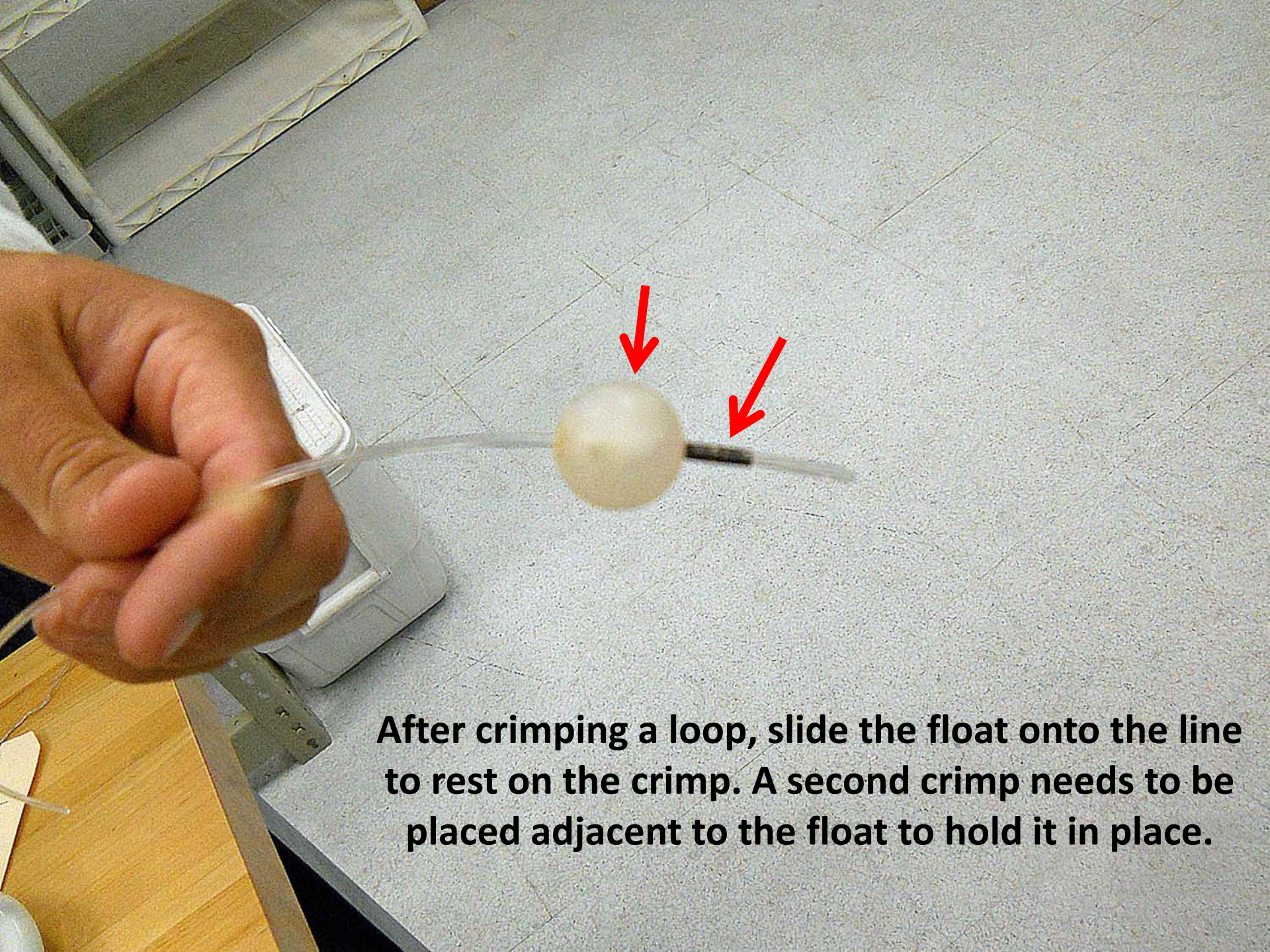
Replace the connectors if broken by removing the broken one and replacing with a new one.

Rebuilding a horizontal cable assembly requires monofilament or wire, crimps and a crimping tool



Form a loop at the end of the
new retaining line and attach a crimp. Make sure the loop is large enough slide easily on/off the actuating prong

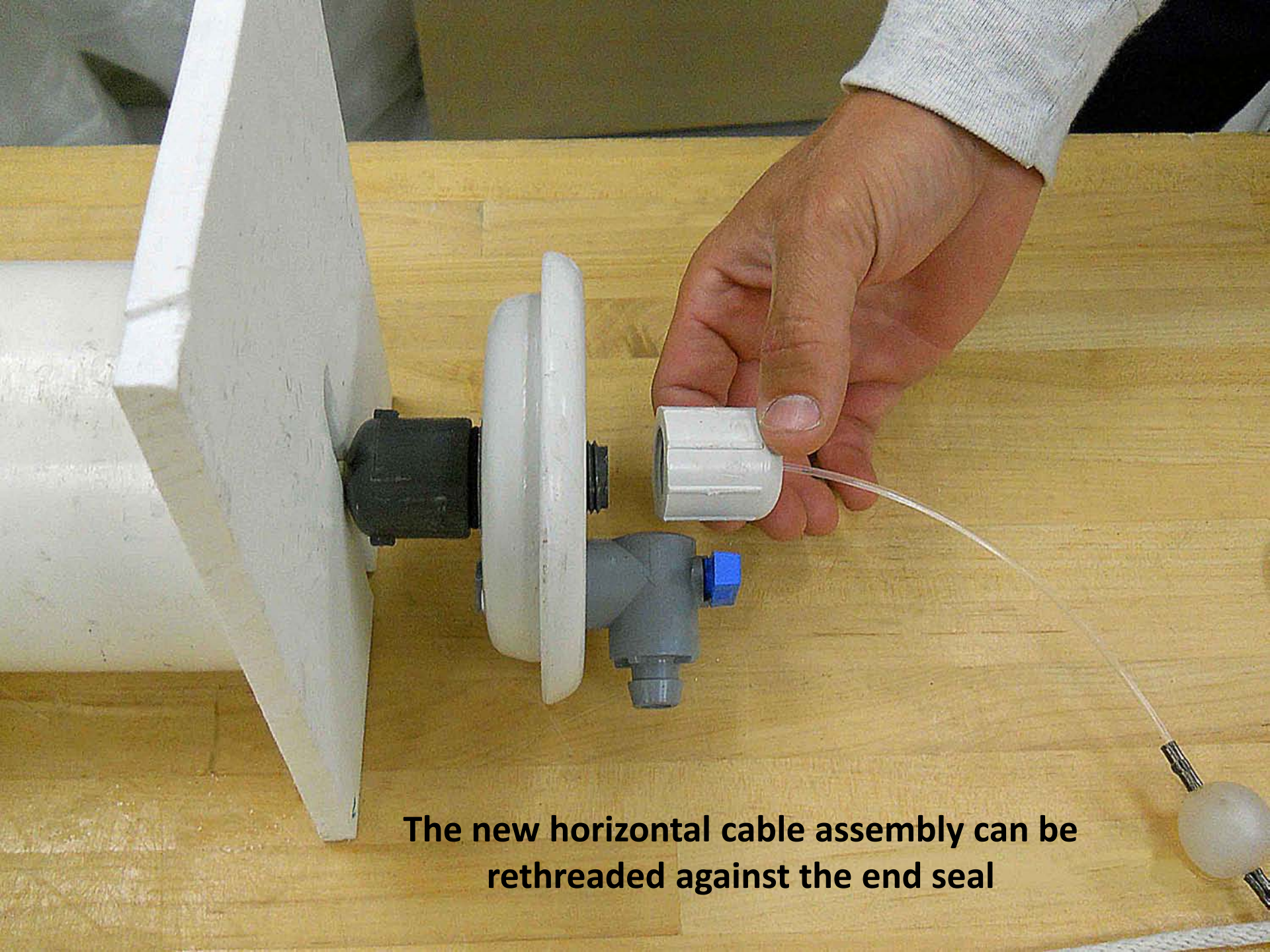




After crimping a loop, slide the float onto the line to rest on the crimp. A second crimp needs to be placed adjacent to the float to hold it in place.

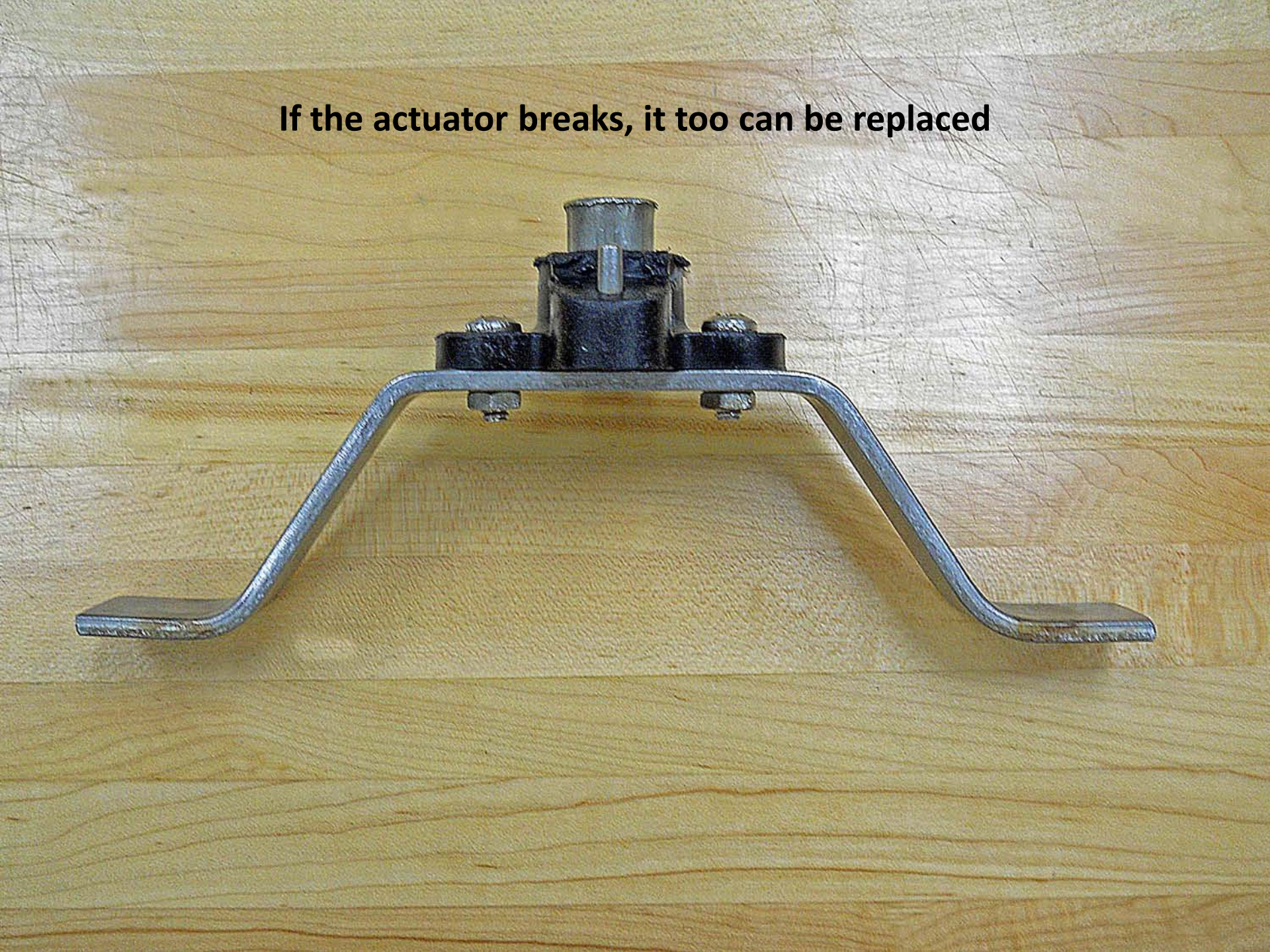

Add a cap and then a crimp on
the inside of the cap

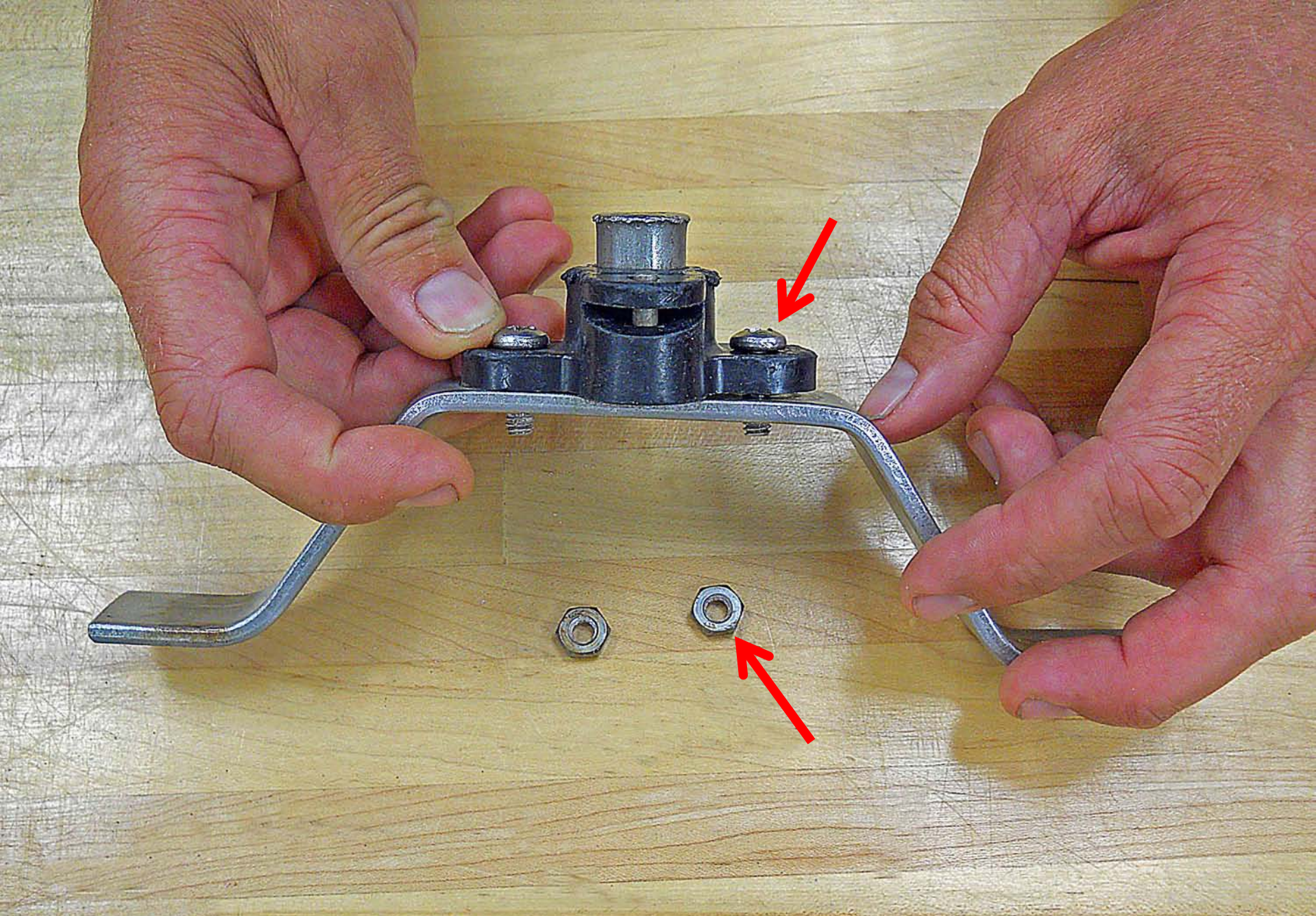

Check to make sure the
crimped loop slides easily
on and off the actuator prong



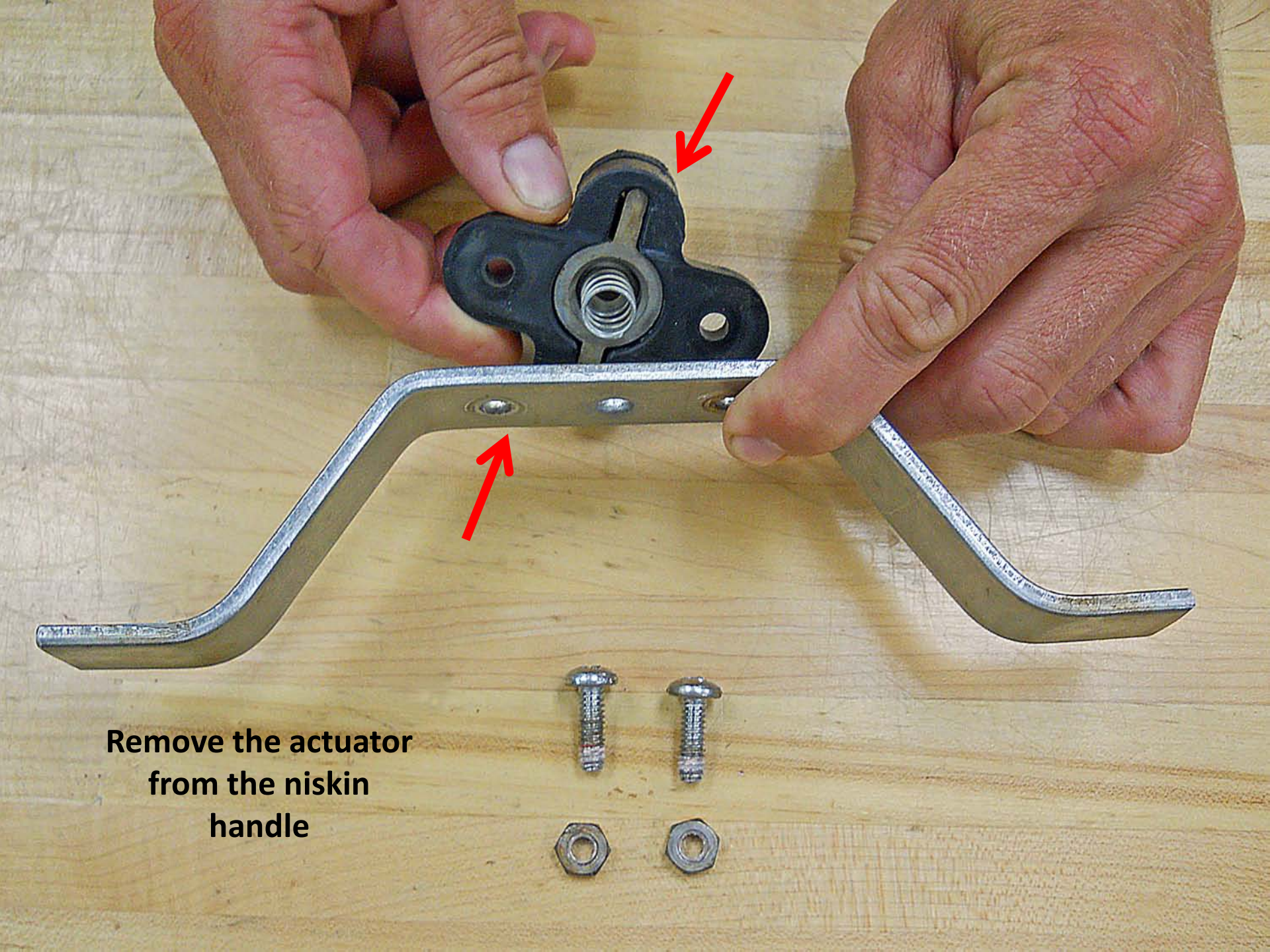
The new horizontal cable assembly can be rethreaded against the end seal

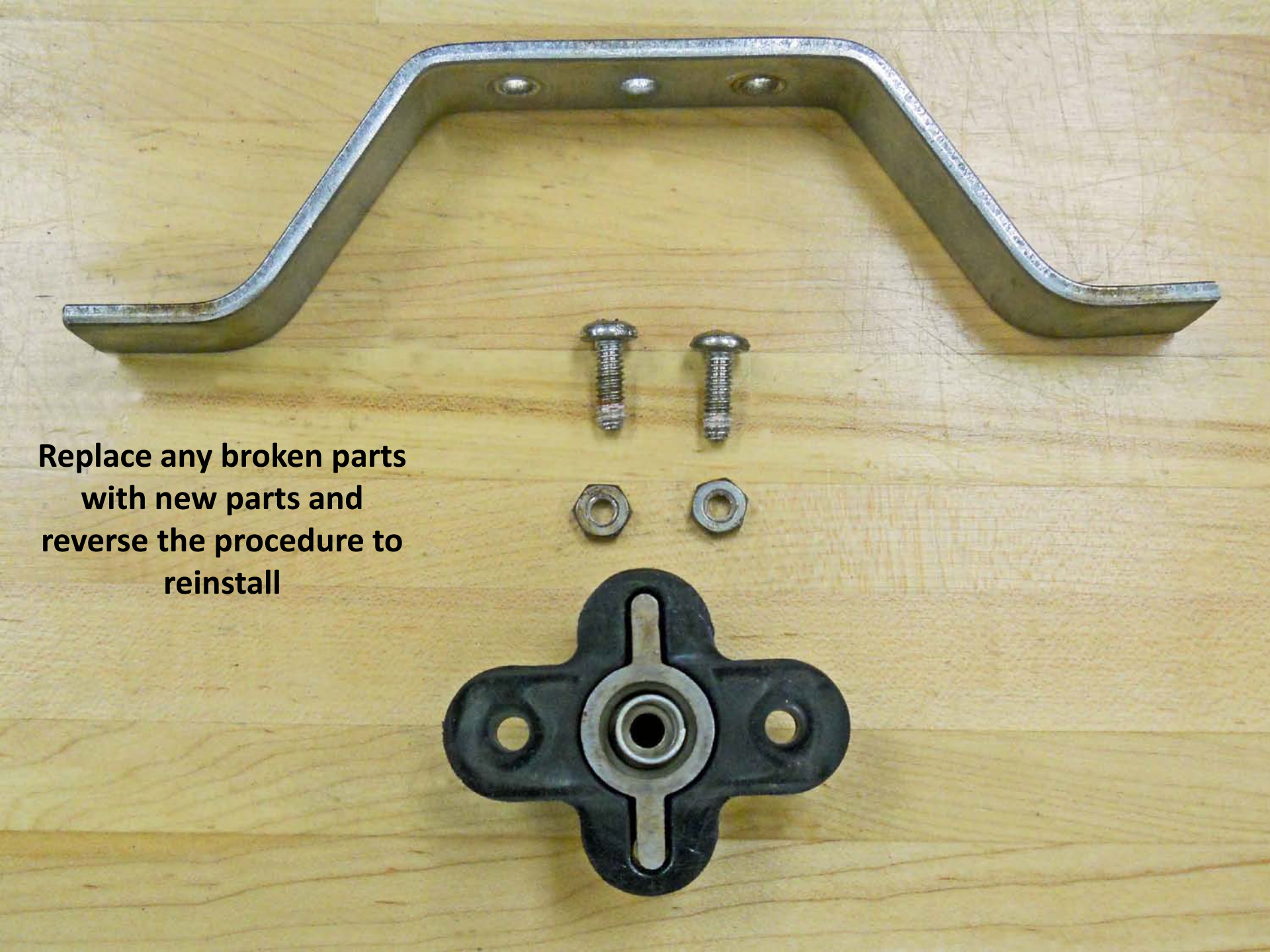
If the actuator breaks, it too can be replaced



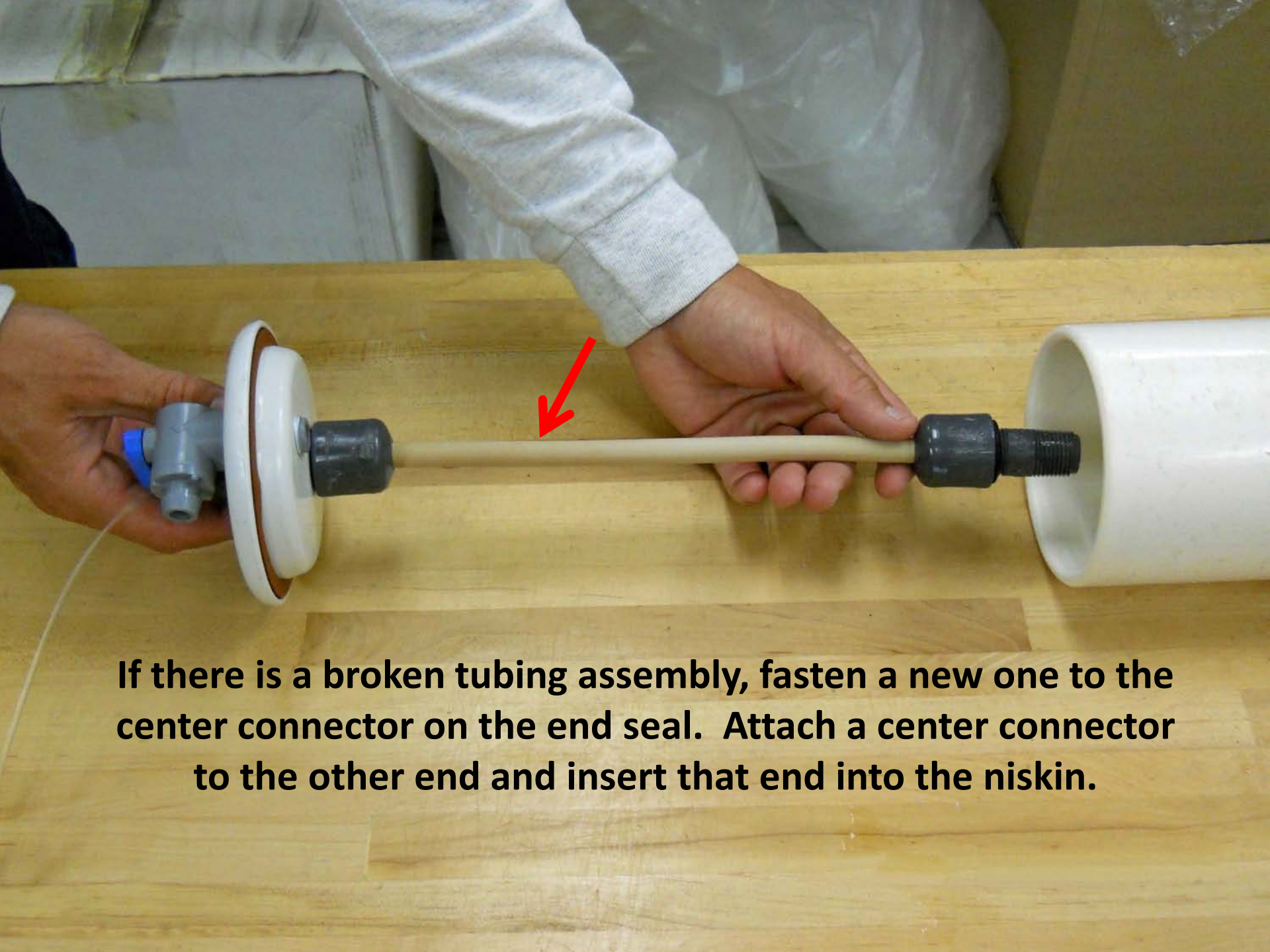


Remove the nuts and screws from the actuator flange


Remove the actuator
from the niskin
handle

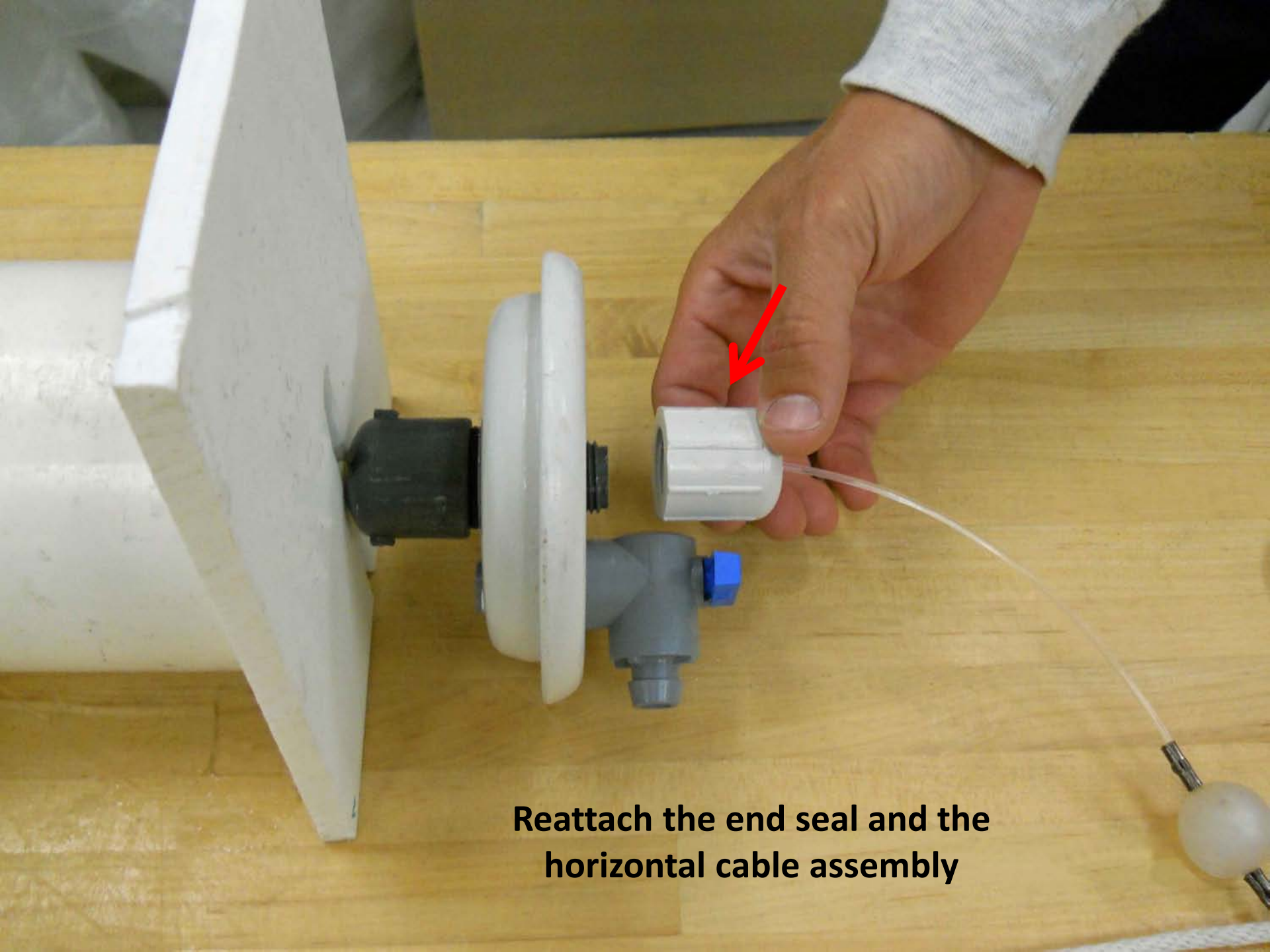


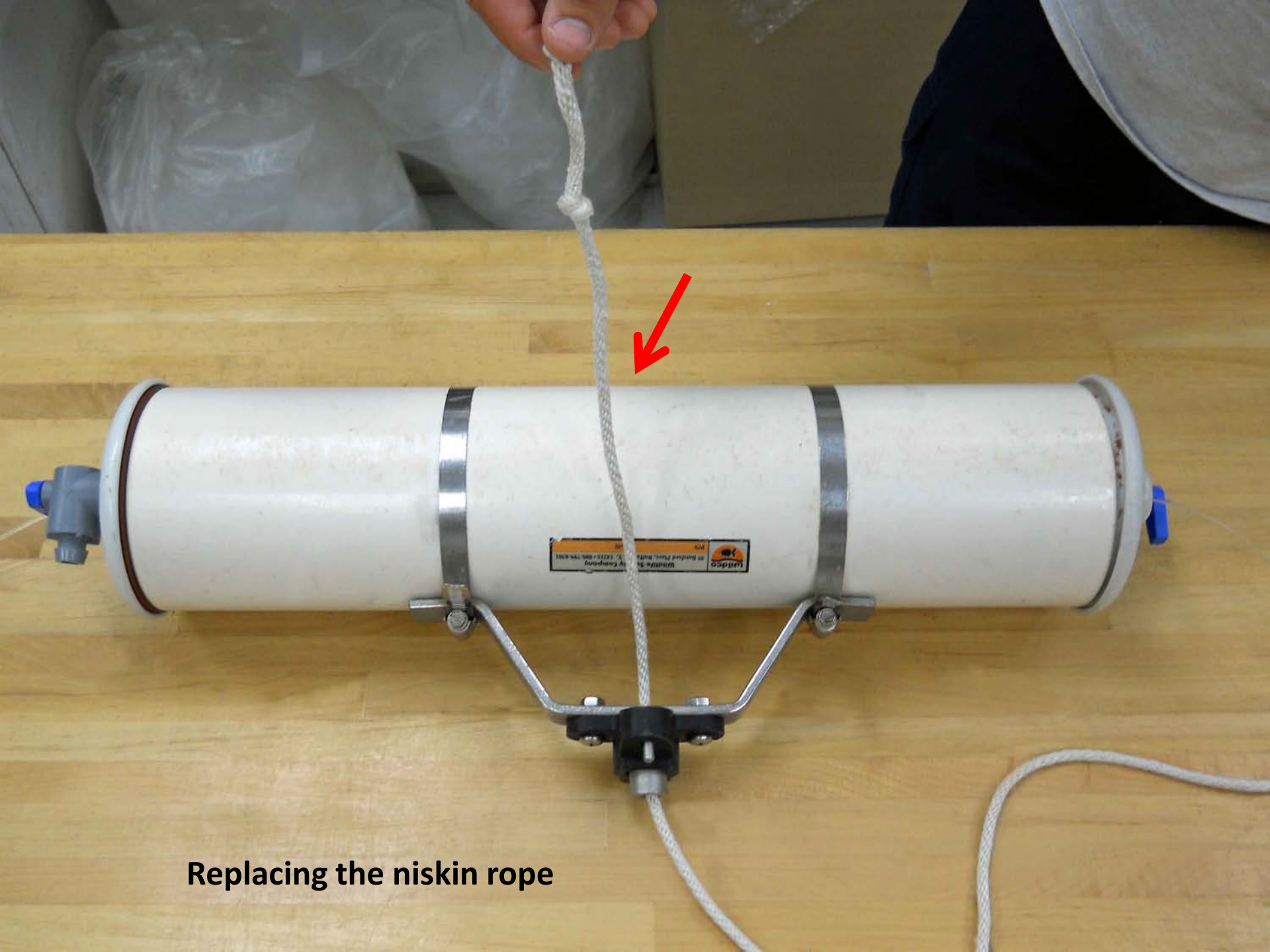
Replace any broken parts with new parts and reverse the procedure to reinstall



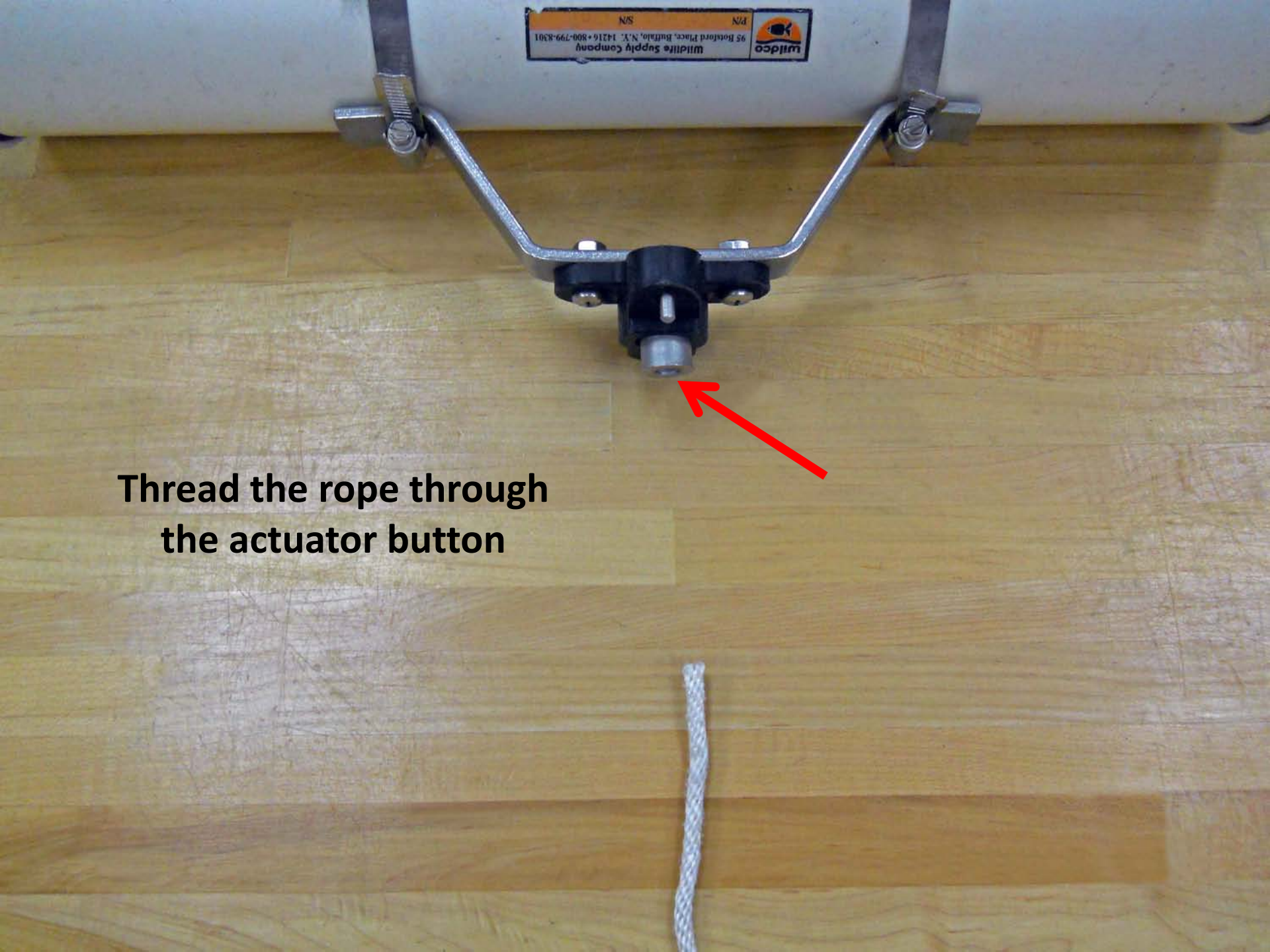
If there is a broken tubing assembly, fasten a new one to the center connector on the end seal. Attach a center connector to the other end and insert that end into the niskin.


Stretch the tubing through the niskin and hold it in place with a temporary retainer

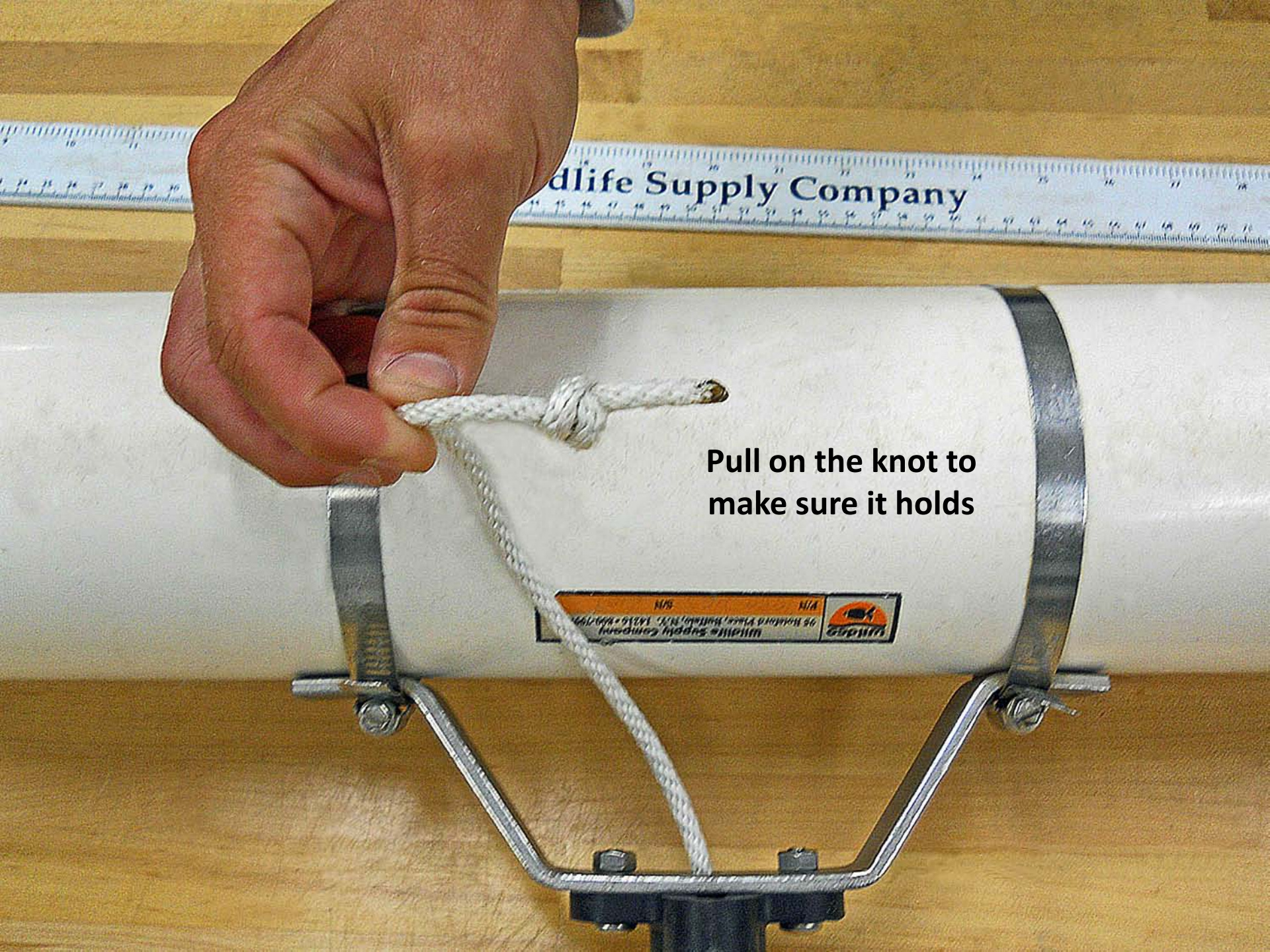

Reattach the end seal and the
horizontal cable assembly

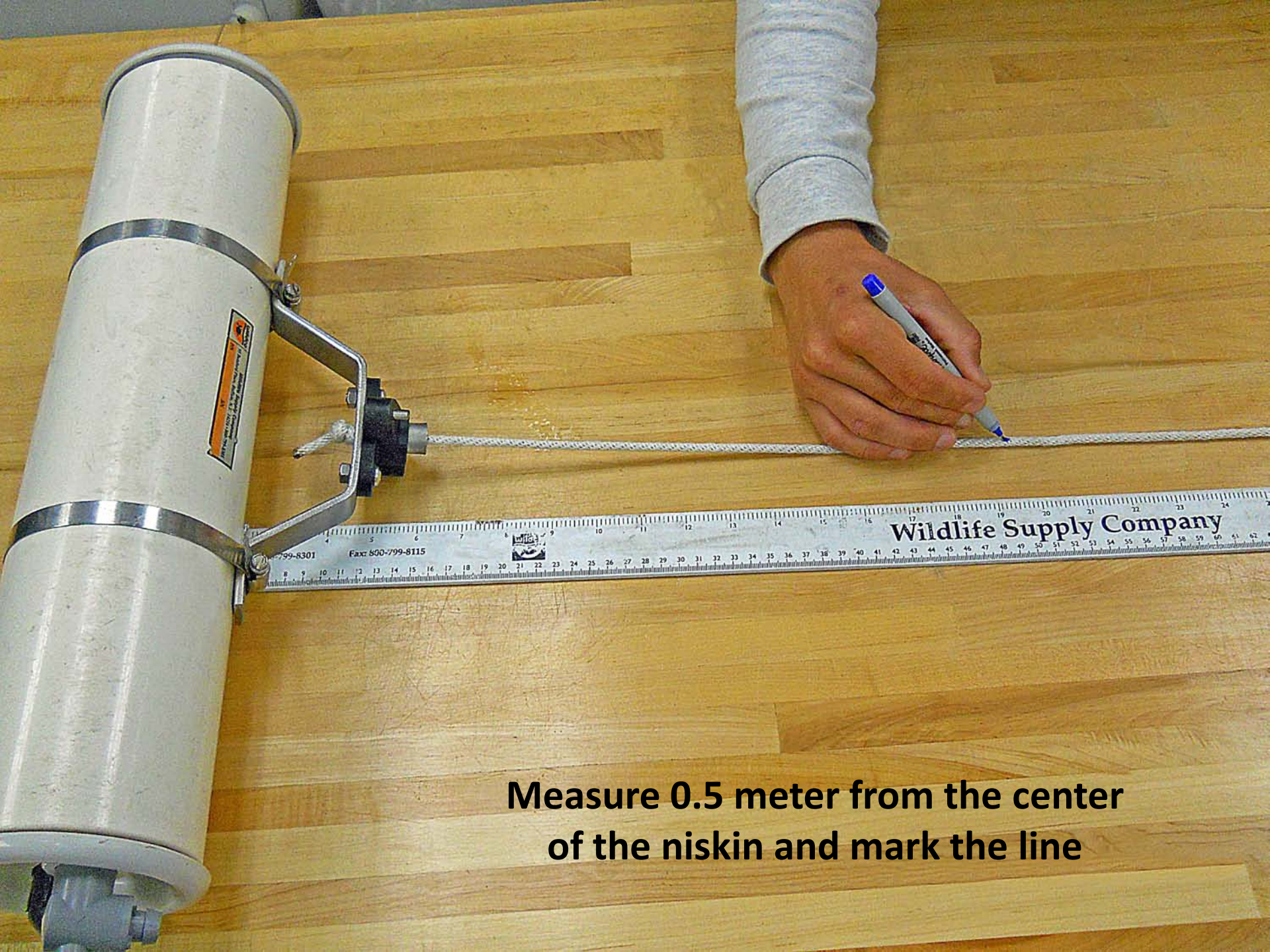


Replacing the niskin rope


wildco
wildlife supply company
95 Boxford Place, Buffalo, N.Y. 14216 • 800-799-8301
P/N
S/N
Thread the rope through
the actuator button


Tie a sturdy knot
in the rope

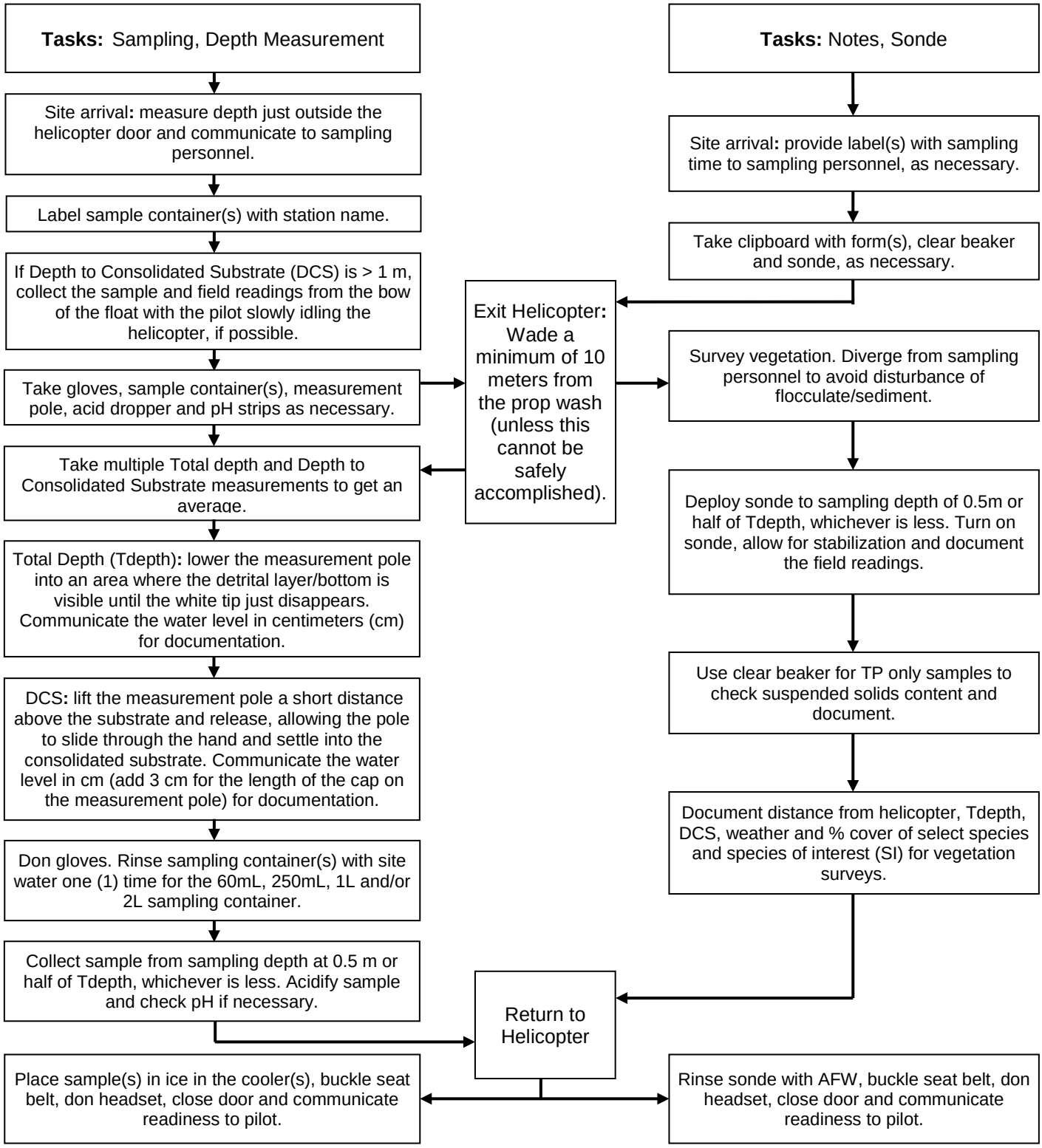

dlife Supply Company
Pull on the knot to
make sure it holds



Measure 0.5 meter from the center of the niskin and mark the line

Make sure the hose clamps are tight on the handle

Marsh Sampling by Helicopter
(EVPA, WCA1T, WCA-2A and RTBG)



Note: TP only samples are acidified at sample collection site; full or partial parameter sets are processed within 4 hours of collection at the laboratory.

Summary of Changes to SFWMD-FIELD-QM-001-08	
Table / Section	**Summary of Changes**
Acroynms	New addition to the FSQM
All Sections	Changed language from 'WQMD' to 'WQM' throughout the FSQM due to organizational changes
All Sections	Changed language from QA member or QAO to 'a member of the WQM QA team' throughout the FSQM
All Sections	Language changed from second to third person
All Sections	All repetitive language from previous versions deleted
All Sections	Changed language from sonde or field instrument to 'multi-parameter instrument'
Section 1	Added language, updated Ethics and Data Integrity Agreement
Table 2.0.A	Updated language on duties and postions in WQM
Section 3	Updated and clarified language, removed tables that were located in the SFWMD SOPs or the FDEP SOP
Table 3.2.A	Added and deleted language, added sampling equipment
Table 3.2.B	Updated in-situ field measurement instruments
Table 3.2.C	Added nalgene and amber glass sample bottles
Table 3.2.D	Added language, removed language that was listed in the SFWMD SOPs
Table 3.2.E	Changed language
Table 3.2.F	Updated field supplies
Section 3.3	Added 'Preventive Maintenance' language from Section 5.1.6 of the 2011 FSQM, clarified language and updated tables 3.3A and 3.3B
Table 3.3.A	Removed N-Con Collectors from table; located in the SFWMD SOP
Table 3.3.B	Updated language and removed Quanta instrument since no longer in use
Section 4	Updated language and removed sections that were listed in the SFWMD SOPs
Section 5	Updated and clarified language, removed Autosampler and RAIN protocol, left Grab sampling protocol only; Autosampler now Section 6 and RAIN is a SOP
Section 5.0.1	Added reference SOP
Section 5.1.3	Added language for 'Grab Sampling with a peristaltic pump or autosampler'
Section 5.2.2	Added language to not reuse filters between sampling sets
Section 5.2.2	Added language for the number of drops of acid used for blank and regular samples
Section 5.3	Added language for temperature blanks immersed in ice when shipping samples
Table 5.0.B	Changed the preservative column from Cool 4 °C to > 0 °C and ≤ 6 °C, added language to NOTES at the end of table (# 10), deleted Analyte Fluoride
Section 6	New section, autosampler information only
Section 6.1	Added language for discrete bottles to be 1) inspected weekly for contamination, 2) replaced quarterly and 3) utilized up to three months from the date of laboratory cleaning if stored in a sealed, non-perforated bag
Section 6.3	Added 1) SFWMD website for the autosampler trigger counts, 2) language that FST must be recorded when sample is discarded and 3) language for the sampling procedure when the Autosampler collects more than 24 1-liter bottles

Section 6.4	Added language for refrigerated autosampler for 1) recording temperatures from the HOBO Pendant® Temperature Data Logger and 2) replacing the 5-gallon jug quarterly if no sample has been collected within that quarter
Section 6.6	Added language to check for presence of bubbles after the first tubing rinse
Section 6.9	Added language to Section 6 (previously Appendix A)
Section 6.9.5	Added language for the HOBO Pendant® Temperature Data Logger
Section 7	Updated title from 'Field Testing' to 'Instrument Calibration and Field Measurements'
Section 7	Updated and clarified language throughout the section
Section 7.10.2.1 & 7.10.2.2	Added and updated language to Quarterly and Annual temperature check
Section 7.15	Added language for 'S' qualifier for 'Secchi visible On Bottom'
Table 7.17.A	Added language for pH and Conductivitiy Standards that are transported to the field within polyethylene bottles labeled with the standard set ID and discarded at the end of the day
Section 7.17.1	Added language 'the vendor catalog number (per FDEP SOP FD 4100) must be recorded in logbook'
Table 7.17.B	Updated table to reflect the catalog numbers
Section 8	Updated and clarified language throughout the section
Section 8.0	Original PSR, FTR and Field Notes must be submitted to District Laboratory
Section 8.2.2	Added language for 1) Two PSRs, 2) Two HFDM files with one blank, 3) no sample collected with station visited or not visited, 4) Generic Collector names must be crossed off and dated/initialed, 5) UD code for coastal sampling station and 6) FST
Section 8.2.5.1	Added language under 'Comments' to not use special characters in HFDM
Figure 8.2.5.A	Updated Field Note Sheet
Section 9	Updated and clarified language throughout and combined with Section 10
Section 9.1.1	Added language for QC reduction for projects collected quarterly and bi-monthly
Section 9.1.1 & 9.1.2	Added language for collection of a single train (the autosampler equipment combined with the grab sampling equipment)
Section 9.1.3	Added language that blanks must be preserved with the greatest amount of preservative that was required in the associated sample set
Section 9.1.7	Added language for Autosampler Equipment Blank (ASEB)
Table 9.3.A	Added 'S' qualifier code along with definition
Section 10	Updated title, updated and clarified language pertaining to Water Quality Monitoring Audits
Section 11	Updated and clarified language throughout the section