



DEP Quality Assurance Requirements for Sample Collection & Field Testing

Department of Environmental Protection
Environmental Assessment Section
Bureau of Standards and Special Projects

This course will....

- Help you navigate and use the DEP SOPs to your advantage.
- Give you an opportunity to expand on what you already know and ask questions.
- Provide hands-on training to improve technique.

This course will NOT....

- Act as a alternative to reading the SOPs.
- Make you an instant expert.

General Considerations for sampling

- Understanding of sampling and Data Quality Objectives
- Obtaining a representative sample
- Maintaining the integrity of the sample
- Documentation

Contacts: firstname.lastname@dep.state.fl.us



**Russel
Frydenborg,
Administrator**



**Silky
Labie**



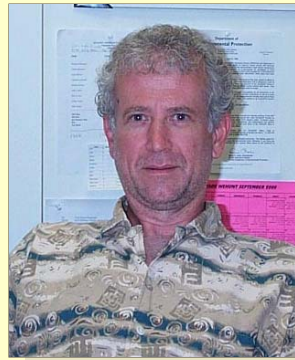
**Denise
Miller**



**Andrew
Tintle**



**Joy
Jackson**



**Michael
Blizzard**



**Thomas
Frick**



**Daniel
Wardell**



**Jessica
Patronis**

The SOPs are a valuable resource

- Quick reference
- Clarify methods
- Example forms
- Tables



! The SOPs are currently undergoing revision !

Summary of field SOP Changes

- Clarify procedures for field-QC Blanks
- New groundwater procedures for large-volume, high-recharge wells.
- Allow collection of extractable (semi-volatile) organic analytes through peristaltic pump.
- Update sample preservation/holding-time tables.
- New training procedures for SCI sampling.
- New procedures for LVI, RPS and Qualitative Periphyton sampling.
- Delete seldom-used field testing SOPs.

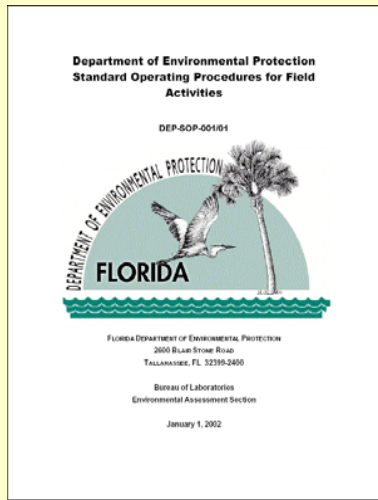


Where to Find the SOPs:

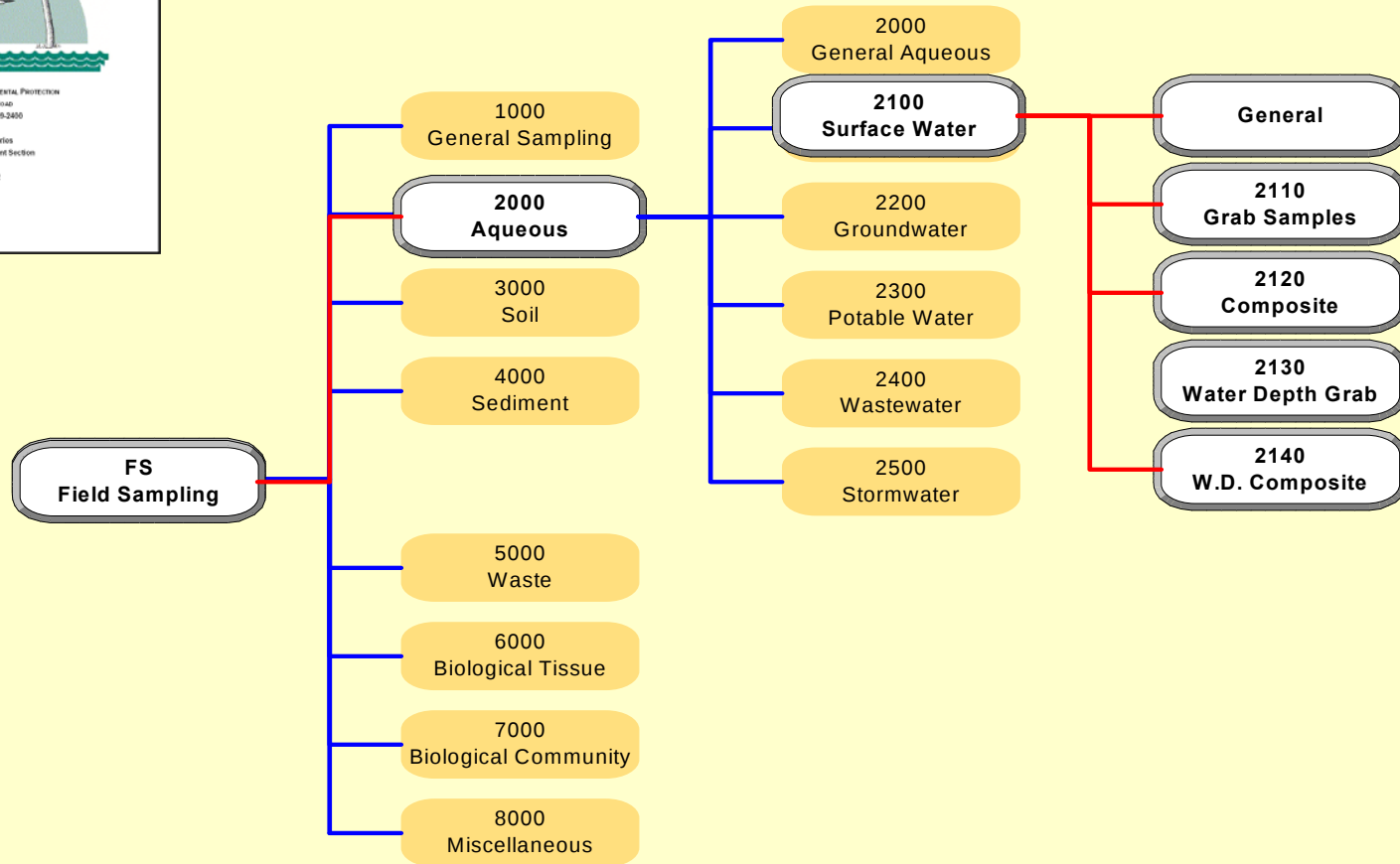
www.dep.state.fl.us/labs/sop/index

eNewsletter

<http://www.dep.state.fl.us/labs/training/listserve.htm>



SOP Design



DEP-SOP-001/01

(revision date 2/1/04)

What does the DEP QA Rule (FAC 62-160) require?

- Use DEP SOPs (revision date 2/1/04)
- Pre-approve alternative procedures
- Keep mandatory documentation
- Follow preservation & holding times
- Auditing



Quality Manual

Includes quality assurance policies
and procedures for your specific
organization

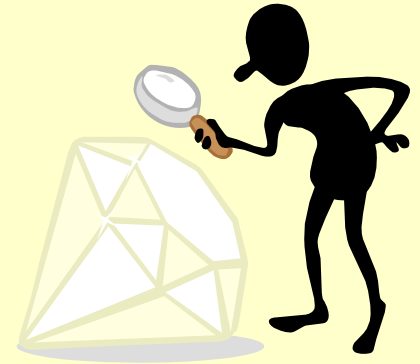


Quality Manual

Includes quality assurance policies
and procedures for your specific
organization

***See requirements in SOPs, FA 3300**

Auditing



You may be audited by DEP!

Find Checklists:

- FA 1000 appendix
- **<http://www.dep.state.fl.us/labs/library/index.htm>**

FD 1000 Documentation



There are universal requirements as well as specifics for each type of documentation.

➤ Example forms

Parameter Suite	Parameter(s)/Method	Matrix Code*	Preservation**	Preservative Lot #	pH Check	# Bottles ***
Preserved Nutrients	☒ TKN ☒ TP ☒ NOx ☒ NH3 ☐ TOC ☒ Total N ☐ Other: _____	W	☒ Ice ☒ H ₂ SO ₄		☒ <2	1
Filtered Nutrients	☐ oP ☐ Other: _____	W	☐ Ice ☐ .45 um Filter			
Unpreserved Nutrients	☐ NO ₂ ☐ NO ₃ ☐ SO ₄ ☐ Other: _____	W	☐ Ice			
Physical/Aggregate Properties	☐ TDS ☐ TSS ☐ TS ☐ Turbidity ☐ Alk ☐ Color ☐ Other: _____	W	☐ Ice			
Chlorophyll	☒ CHL-PPTN-W	W	☒ Ice			1
BOD	☐ BOD-INHB ☐ BOD-UNIN	W	☐ Ice			
Microbiology	MF: ☐ E coli ☒ T Coli ☒ F Coli ☐ Entero ☐ F Strep	W	☒ Ice			2
Macroinvertebrates	☐ MI-FW-QLDC ☐ MI-FW-QLBR ☐ MI-FW-QNNC ☐ MI-MN-QNNC	W	☐ Formalin			
Phytoplankton	☐ PKD-QN-C ☐ DTY-QN-C	W	☐ Lugol's			
Periphyton	☐ PRN-QL-C ☐ DTM-QL-C ☐ PRN-QN-C ☐ DTM-QN-C	W	☐ Formalin			
AGP	☐ AA-AGP ☐ AA-LIM-NUT	W	☐ Ice			
Metals	ICPMS ☐ W-ICP-Tr	W	☐ HNO ₃		☐ <2	
Filtered Metals	☐ W-ICPMS-F ☐ W-ICP-Tr-F	W	☐ HNO ₃ ☐ .45 um Filter		☐ <2	
Mercury		W				
Base Neutral Extractable	ABN ☐ W-PAH Other: _____	W	☐ Ice			
	☐ W-PEST-NP ☐ W-PSCL-PCB	W	☐ Ice			
Pesticides	AA-SF ☐ W-PSHRB-NP SULFN-LC ☐ Other: _____	W	☐ Ice			
		W	☐ Ice ☐ H ₂ SO ₄			
Purgeable		W	☐ Ice ☐ MCAA			
Bioassay		W	☐ Ice ☐ HCl			
OTHER		W	☐ Other: _____			

BLANK FORM FOR FIELD USE ONLY

Site Name: _____ Date: _____ Time: _____

Operator: _____

Examples: Time, Moisture

Notes:

Use one line for each set of sample (as supplied by the laboratory) containers. Use separate sheet for field or laboratory duplicate or blank or different water depth.

*Enter "D" for surface (collected at a depth less than or equal to 1 foot)
 *Matrix Codes (water profile): SW = Surface Water, GW = Groundwater, DW = Drinking Water, WW = Wastewater, O = Other
 **Preservation codes not added unless otherwise noted
 ***Take number of bottles supplied by the laboratory for the test (e.g., 3 for volatile organics, etc.)

DEP Bureau of Laboratories Water Sample Collection Record
 (See also DEP-100-00000 Form 10-2000-01 Public Use of Data Collection Field Sheet)

➤ Specific information by parameter

★ Can you find their mistake?

Parameter Suite	Parameter(s)/Method	Matrix Code*	Preservation**	Preservative Lot #	pH Check	# Bottles***
Preserved Nutrients	☒ TKN ☒ TP ☒ NOx ☒ NH3 ☐ TOC ☒ Total N ☐ Other: _____	W	☒ Ice ☒ H ₂ SO ₄		☒ <2	1
Filtered Nutrients	☐ oP ☐ Other: _____	W	☐ Ice ☐ .45 um Filter			
Unpreserved Nutrients	☐ NO ₂ ☐ NO ₃ ☐ SO ₄ ☐ Other: _____	W	☐ Ice			
Physical/Aggregate Properties	☐ TDS ☐ TSS ☐ TS ☐ Turbidity ☐ Alk ☐ Color ☐ Other: _____	W	☐ Ice			
Chlorophyll	☒ CHL-PPTN-W	W	☒ Ice			1
BOD	☐ BOD-INHB ☐ BOD-UNINH	W	☐ Ice			
Microbiology	MF: ☐ E coli ☒ T Coli ☒ F Coli ☐ Entero ☐ F Strep	W	☒ Ice			2
Macroinvertebrates	☐ MI-FW-QLDC ☐ MI-FW-QLBR ☐ MI-FW-QNNC ☐ MI-MN-QNNC	W	☐ Formalin			
Phytoplankton	☐ PKD-QN-C ☐ DTY-QN-C	W	☐ Lugol's			
Periphyton	☐ PRN-QL-C ☐ DTM-QL-C ☐ PRN-QN-C ☐ DTM-QN-C	W	☐ Formalin			
AGP	☐ AA-AGP ☐ AA-LIM-NUT	W	☐ Ice			
Metals	ICPMS ☐ W-ICP-Tr	W	☐ HNO ₃		☐ <2	
Filtered Metals	☐ W-ICPMS-F ☐ W-ICP-Tr-F	W	☐ HNO ₃ ☐ .45 um Filter		☐ <2	
Mercury		W				
Base Neutral Extractable	PAH ☐ W-PAH Other: _____	W	☐ Ice			
	☐ W-PEST-NP ☐ W-PSCL-PCB	W	☐ Ice			
Pesticides	AA-SF ☐ W-PSHRB-NP SULFN-LC ☐ Other: _____	W	☐ Ice			
		W	☐ Ice ☐ H ₂ SO ₄			
Purgeable		W	☐ Ice ☐ MCAA			
Bioassay		W	☐ Ice			
OTHER		W	☐ Other: _____			

➤ Specific information by parameter

➤ Notes and footer for clarification

Notes: _____

[illegible]

Use one line for each set of sample (as supplied by the laboratory) containers. Use separate sheet for field or laboratory duplicate or blank or different water depth

***Enter number of containers supplied by the laboratory for the test (e.g., 3 for volatile organics, etc.)

DEP Bureau of Laboratories Water Sample Collection Record

(Use with FDEP SOP-001/01 Form FD 9000-3 Physical/Chemical Characterization Field Sheet)

Good Documentation Habits



**“When in doubt, write
it down”**

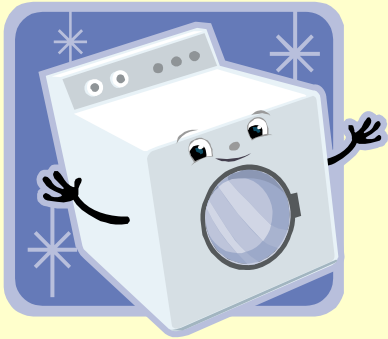
Link bottles to records.

- ★ Unique bottle ID

Also,

- Site
- Date
- Time
- Numbered if multiples

“Performance-Based” Cleaning



Cleaning to meet a set of specifications rather than following a rigid, required procedure



- ★ Propose and demonstrate effective technique



FQ 1000

Quality Control Samples

Required

- Sampling QC Blanks

Optional

- Duplicates or Replicates
- Split Samples

-
- ★ Your DEP SOP tells you which analytes require QC blanks to be taken.

What are blanks for?

Monitor sampling environment,
container/equipment cleaning,
preservatives, analyte-free water, and
storage and transport conditions.

Why use blanks?

- Show that samples have not been contaminated
- Ensure that samples are representative of the sampling source
- Field-collected data have stated limits of precision and accuracy

Field Blanks



Analyte-free water collected directly into a sample bottle at the sampling site.

Equipment Blanks

Analyte-free water collected by rinsing the sampling equipment at the sampling site.



Collect *before* using pre-cleaned equipment

Collect *after* cleaning equipment in the field

Trip Blanks (VOCs Only)

VOC vials filled with analyte-free water accompany the real VOC samples through the entire sampling trip.

- ★ Remain unopened until analysis
- ★ Min. 1 vial per VOC cooler, and trip.

For each Project and each matrix and analyte combination (except VOCs), Collect 1 blank for 20 environmental samples

Handle blanks exactly like the
associated environmental
samples!

Handle blanks exactly like the
associated environmental
samples!

FQ1200- Raise your hand to answer these questions!



FS 1000 **General Sampling Procedures**

Important information for all types of sampling

Useful tables:

- Sample Preservation, Holding Times & Container Types
- Construction Materials & Approved Sampling Equipment

Grab Samples

A snapshot in time

Discrete sample collected directly into the sample bottle over a period of time not exceeding 15 minutes



★ Grab samples can be collected for most analytes

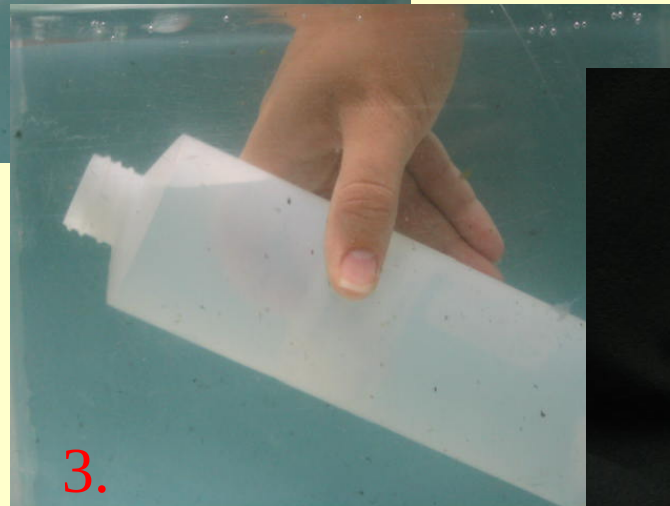
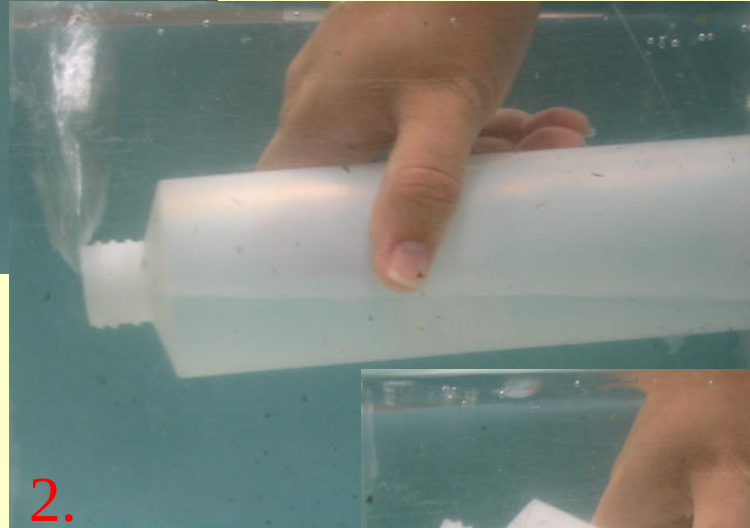
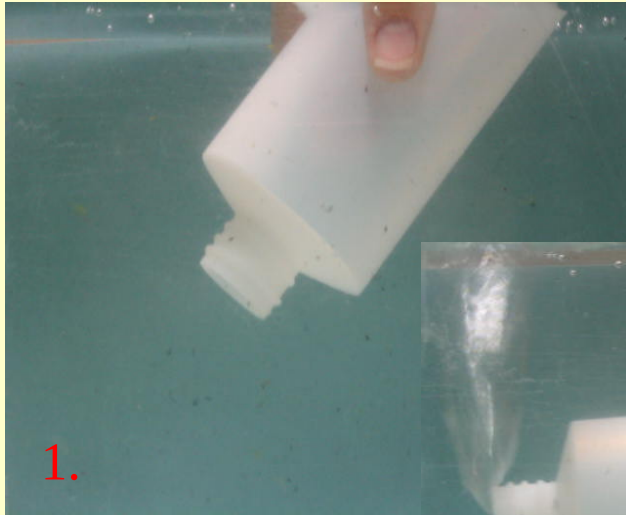
Grabs Using Sample Container

Direct grab is preferred....

But some samples may not conform:

- Using pre-preserved containers
- Depth sampling

Direct Grab Technique



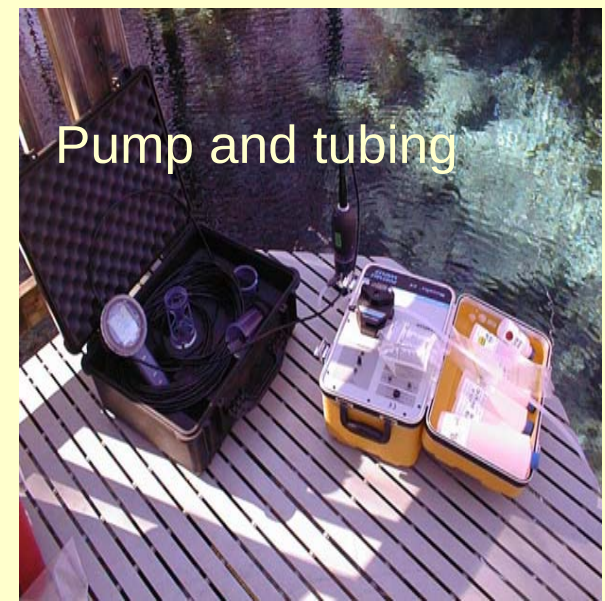
Leave Head
space

★ Avoid skimming

★ Collect Within 1st foot

★ May use pole extension

Equipment selection depends on project objectives and analyte groups....



FS 2000

General Aqueous Sampling

- Collection, Filtration and Preservation Procedures
- Instructions for Specific Analyte Groups



Your sample should be **REPRESENTATIVE**
of the water body you are sampling



Be sure there is nothing happening in the sampling
process to **CONTAMINATE** the samples

- Cross-contamination
- Equipment cleaning

Filtering



- ★ Performed on-site
- ★ Before chemical preservation

& Preservation

- ★ Use tables FS 1000-4 through FS 1000-8



Instructions for specific analyte groups:

➤ Collecting VOC Samples



➤ Sampling for Hydrocarbons (Oil & Grease, TRPH, FL-PRO)

➤ Sampling for Bacteria

➤ Sampling for Cyanide



FS 2450 *Cryptosporidium* and *Giardia* Wastewater Sampling

- Use EPA method 1623
- Follow bacteriological sampling restrictions in FS 2005

BIOSOLIDS

Important considerations for:

- sampling techniques and containers
- safety precautions
- transporting infectious waste



Purging & Sampling Groundwater

Specifications to ensure:

Representative sample

- ★ Collect fresh formation (aquifer) water

No Contamination

- ★ Proper placement of purging devices

Appropriate equipment

- ★ Bailers are not recommended

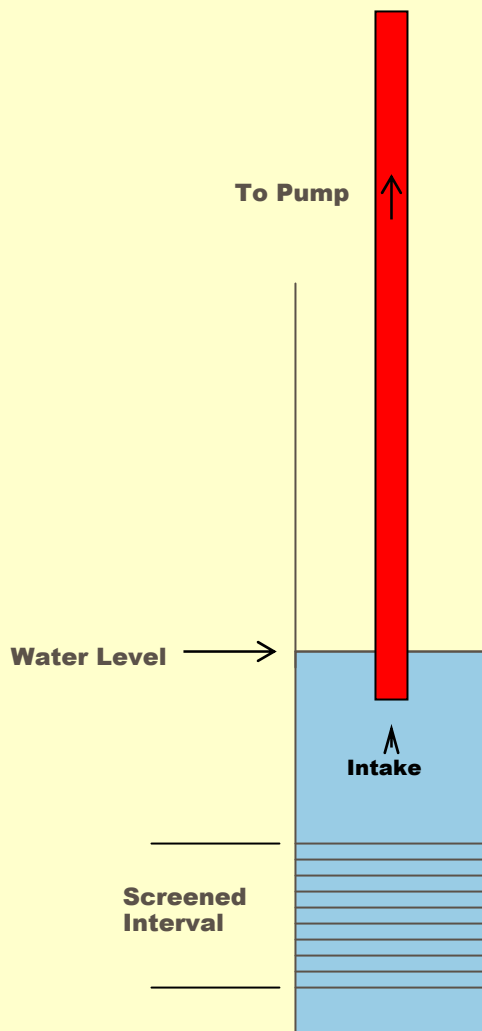
Proper purging completion

Groundwater

Important considerations for:

- Low-Recharge Wells
- Can't achieve purging completion criteria
- Time between purging and sampling
- Wells with installed plumbing

Conventional Purge



Intake placed at the top of water column

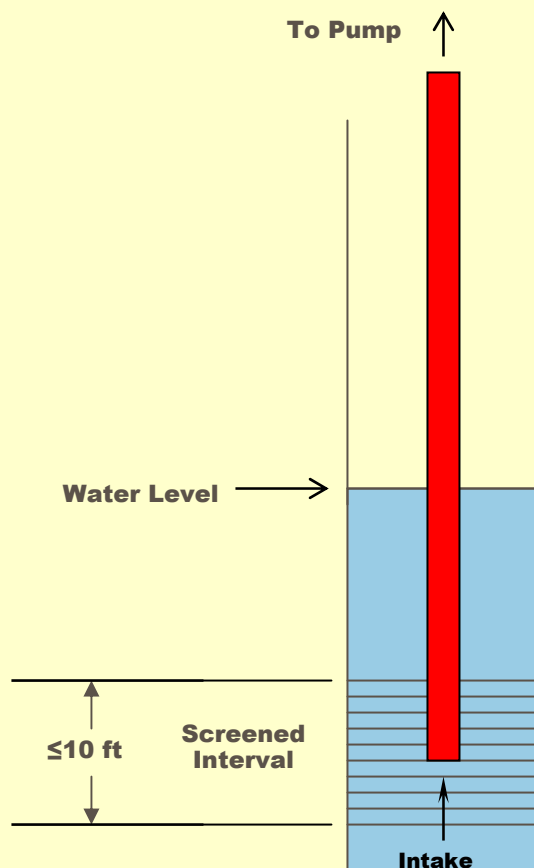
Calculate well volume

Purge one well volume

Measure stabilization parameters no sooner than each $\frac{1}{4}$ well volume interval

Purge at least $1\frac{1}{2}$ well volumes

Minimized Purge Volumes



- Well screen length ≤ 10 feet

Configuration used for both purging and sampling

Intake or pump placed at mid-screen

Calculate equipment volume

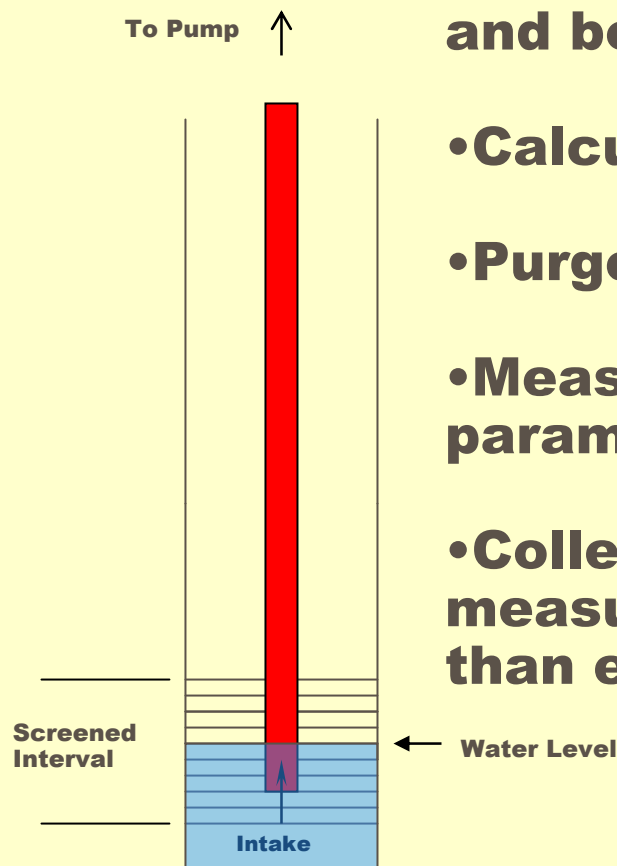
Purge one equipment volume

Measure stabilization parameters

Collect additional measurements no sooner than every 2 minutes

Purge a minimum of 3 equipment volumes

Partially Submerged Screen



- Intake placed at $\frac{1}{2}$ distance between top of water column and bottom of screen

- Calculate well volume

- Purge one well volume

- Measure stabilization parameters

- Collect additional measurements no sooner than every 2 minutes

Collecting Organic Samples With Peristaltic Pumps

- The “trap method” for extractable organics
- The “straw technique” for VOCs

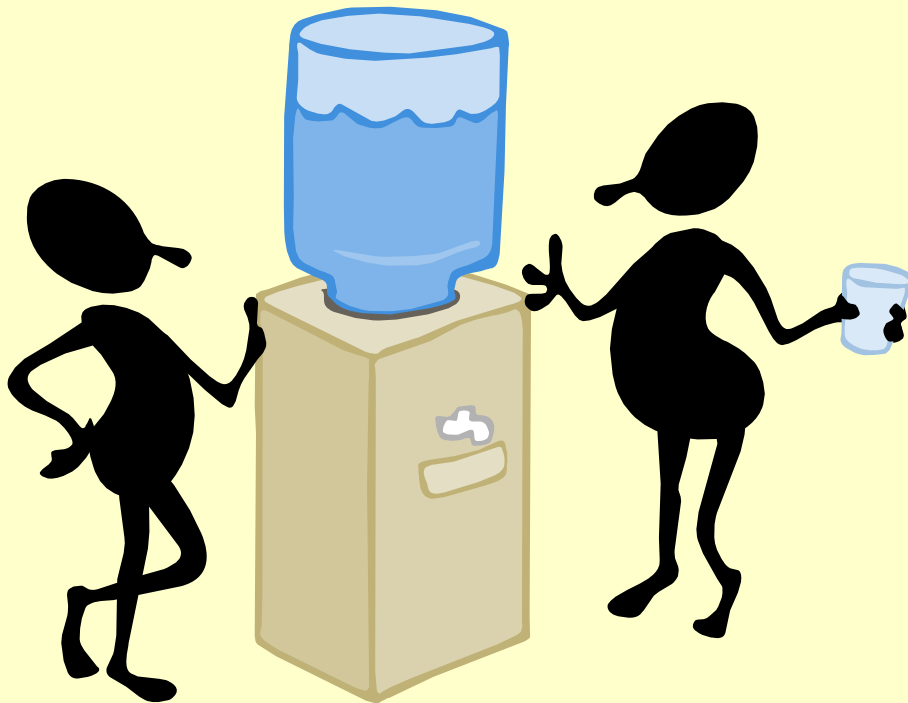


FS 2300

Drinking Water

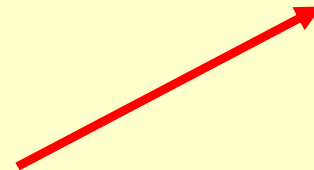
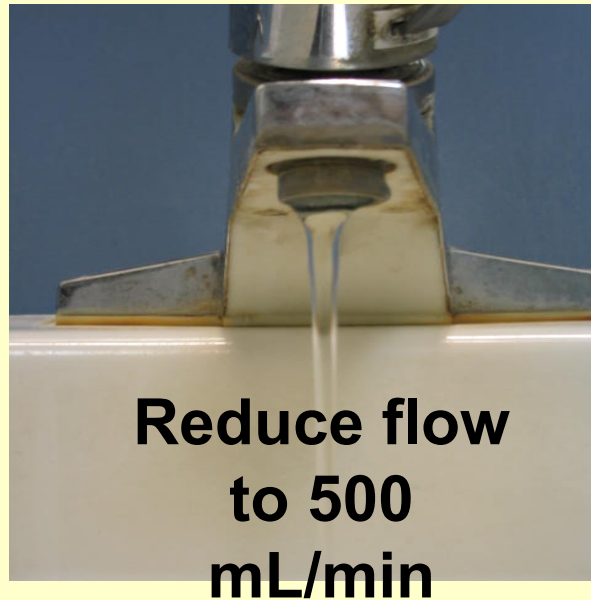
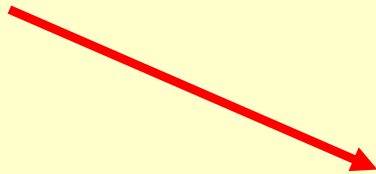
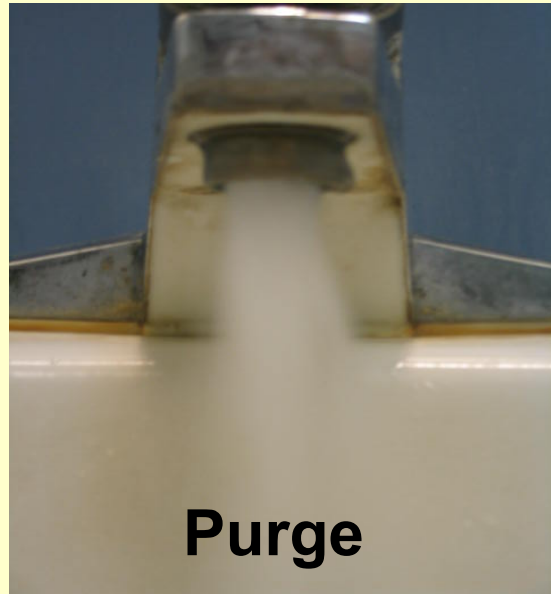


Important considerations for:



- Drinking Water Wells
- Lead and Copper Rule
- Supply Systems
- Microbiologicals

Taking Samples



Sampling VOCs



**Reduce flow to
 ≤ 100 mL/min**

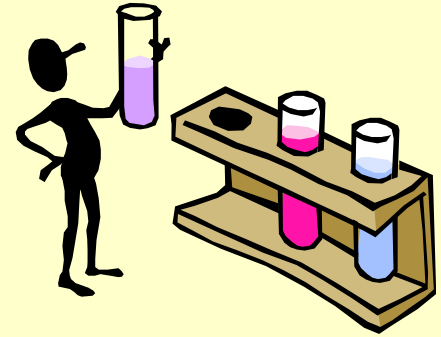
Lead and Copper Rule

- Collect from kitchen or bathroom
- Use cold water tap
- Do not use system for six hours before sampling
- **Collect first flush into sample container**
- **Acid-preservation may be delayed up to 14 days**



FT 1000 – FT 3000

Field Testing

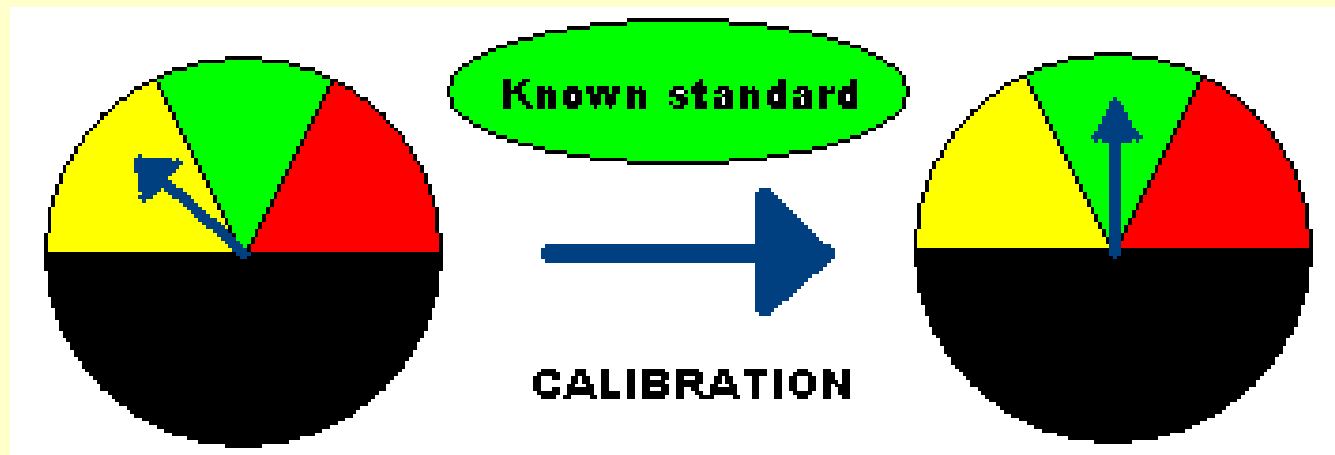


Collecting data in the field

- Calibration of instruments
- Verification of instruments
- Documentation

Calibration:

Changing the reading of an instrument by setting it to a known standard.



Verification:

Reading the instrument with a known standard as if it were a sample.

- ★ Accept/reject reading based on acceptance criterion.

WHY VERIFY?

- Instruments readings are not reliable due to drift

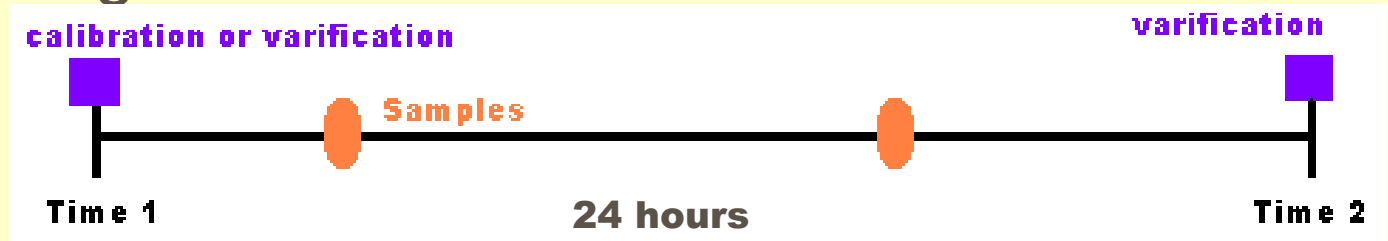
Secondary Standards

- ★ For chlorine and turbidity

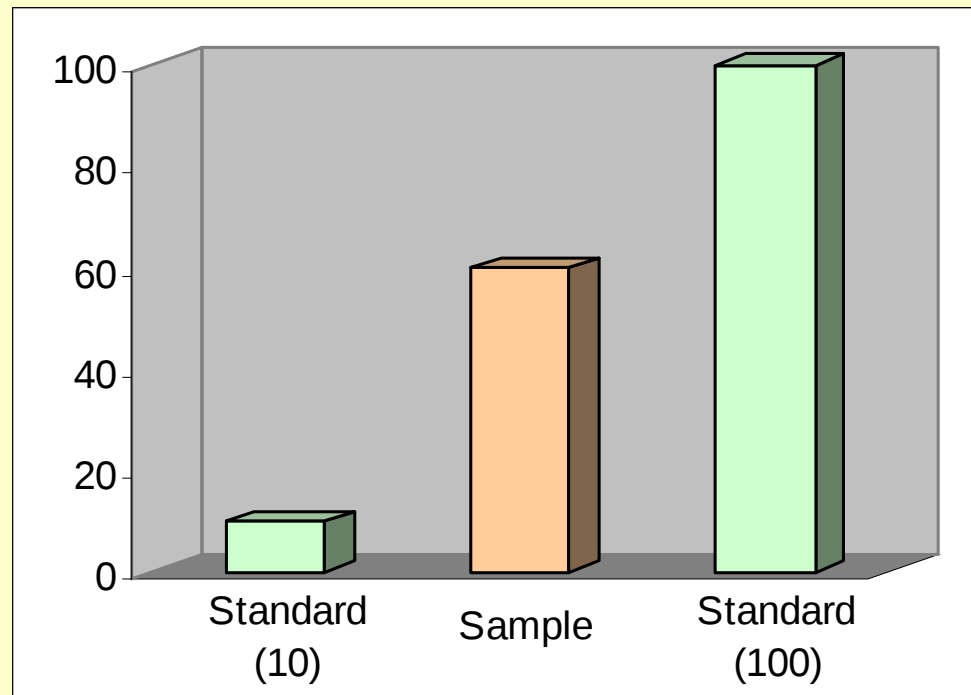


Bracketing

■ Chronological:



■ Quantitative:



Field Testing Acceptance Criteria per DEP-SOP-001/01	
Parameter	Acceptance Criteria
pH	± 0.2 Standard pH Units of calibration buffer
Specific Conductance	$\pm 5\%$ of calibration standard value
Dissolved Oxygen	± 0.3 mg/L of theoretical value
Temperature	NIST-traceable value (with correction factors) Verification over range of sample values
Turbidity	0.1-10 NTU: $\pm 10\%$ of the calibration standard 11-40 NTU: $\pm 8\%$ of the calibration standard 41-100 NTU: $\pm 6.5\%$ of the calibration standard > 100 NTU: $\pm 5\%$ of the calibration standard
Total Residual Chlorine	0.995 calibration curve correlation coefficient $\pm 10\%$ of primary calibration standard value $\pm 10\%$ of secondary standard value

Field Meter Demonstration