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# CHEMISTRY SAMPLING & TESTING EXPERIENCES

in Potable Water Systems

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1

## Presentation Outline



- **Sources of Field Contamination**
- **Equipment & Supplies**
- **Collection / Sampling**
- **Documentation & Delivery**
- **Sources of Lab Contamination**
- **Conclusions**

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2

## Sources of Field Contamination



3

## Sources of Field Contamination



4

## Sources of Field Contamination



5

## Equipment & Supplies



6

## Equipment & Supplies

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7

## Collection - General

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- 1. Glove Up**
  - 2. Inspect/Clean Sample Tap**
  - 3. If sampling from a kitchen or bathroom tap, be sure to remove aerator**
  - 4. Flush**
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8

## Collection – General (con't)



**5. Stage Containers**

**6. Label Containers**

**7. Gauge Flow**

**8. GLOVE UP**

**9. Collect Samples**



9

## Collection - Volatiles



**1. 40-ml amber glass vials  
w/Ascorbic Acid (Dechlor)**

**2. For VOC's, bring ice in  
sealed bags to chill samples  
during collection**

**3. Run water for at least 5  
minutes (medium-fast flow)**

10

## Collection - Volatiles



**4. Label vial with ink. DO NOT USE A SHARPIE!**

**5. Slow water to thickness of a pencil and fill vial to bottom of neck.**

**6. Wait (1 minute)**

**7. Add HCL (about 10 drops)  
Handle dropper & HCl with care!!**

11

## Collection - Volatiles



**8. Continue to SLOWLY fill vial to very top of glass.**

**9. Tighten cap on vial, invert, and tap against hand.**

**10. No air bubbles should be present.**

**11. 14 Day Hold Time**

12

## Collection - Volatiles



- **Travel Blank**

DI water from the lab

- **Field Blank**

DI water from the lab transferred in the field

- **Equipment Blank**

DI water from the lab from transferred to the equipment in the field

13

## Collection – Microbiology



**Total Coliform, Fecal Coliform, e.coli,  
Heterotrophic Plate Count (HPC) or  
Standard Plate Count**

**125 ml plastic sterile container w/ Sodium  
Thiosulfate tablet or powder**

**Must collect from a very clean faucet or spigot**

**Flame or Alcohol or Alcohol Wipes to be used to  
prep sampling point (eliminates any bacteria)**

14

## Collection – Microbiology (con't)



**DEFINITELY Glove Up!**

**Do not let anything touch inside of lid of sample container**

**Make sure sample stream is minimal**

**Do NOT overfill container**

**Chill sample immediately after collection**

**Highly suggest to put micro samples in a separate cooler**

15

## Collection - Metals



- 1. 500-ml plastic w/ HNO<sub>3</sub> (Nitric Acid) (pH <2)**
- 2. Fill To Neck**
- 3. Do Not Overfill**
- 4. pH adjustment in the lab**
- 5. 6-month hold time**
- 6. Room Temperature**

16



## Collection - Metals

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- **Lead and Copper Rule**

### Homeowner sampling

**1 Liter (1000 mls) unpreserved polyethylene container**

**Stagnant Water for 6-8 hours**

**Cold Water Faucet (Kitchen or Bathroom)**

**Take “First Draw” Sample**

**Fill to top of neck without overfilling**

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17

## Collection - Metals

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- **Lead and Copper Rule**

### School sampling

**250 ml unpreserved polyethylene container**

**Stagnant Water for 8 hours**

**Cold Water Faucet (Kitchen or Bathroom or Water Fountain)**

**Take “First Draw” Sample**

**Fill to top of neck without overfilling**

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18

## Collection – Other Inorganics

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**Alkalinity, Sulfate, Fluoride, Chloride, Color, Surfactants, Dissolved Solids, Color, Odor, Turbidity, pH.**

- 1. No preservative**
  - 2. Can use any type of marker for labels**
  - 3. Fill To Neck**
- 

19

## Collection – Other Inorganics

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- 4. Do not allow anything to contact inside of caps or mouth of containers.**
  - 5. Fill to neck of container without overfilling.**
  - 6. 7 to 28 days hold time**
  - 7. 6 degrees C**
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20

## Collection – Other Inorganics



### Cyanide

- 1. 125 ml plastic**
- 2. NaOH (Sodium Hydroxide) preservative**
- 3. Fill to neck and do not overfill**
- 4. 14 day hold time**
- 5. 6 degrees C**

21

## Collection – Other Inorganics



### Nitrate, Nitrite

- 1. 125 ml plastic**
- 2. No preservative**
- 3. Fill to neck and do not overfill**
- 4. 48 hour hold time**
- 5. 6 degrees C**

22

## Collection – Other Inorganics



### Nitrate-Nitrite

1. 125 ml plastic
2. H<sub>2</sub>SO<sub>4</sub> (Sulfuric Acid) preservative. Add to container before sample collection.
3. Fill to neck and do not overflow.
4. 28 day hold time
5. 6 degrees C

23

## Collection – DBP's



### Haloacetic Acids (HAA's)

1. 1 amber glass 250 ml bottle w/ teflon cap
2. 25-30 mg ammonium chloride as preservative
3. Fill to neck and do not overflow
4. 14 day hold time
5. ≤ 10 degrees C first 48 hrs, ≤ 6 degrees C after

24

## Collection – DBP's



### Trihalomethanes (THM's)

1. 3 glass 40 ml vials
2. 25 mg ascorbic acid, followed by 0.5 ml HCl
3. Fill to bottom of neck, wait one minute, add 10 drops of HCl with dropper...HANDLE WITH CARE.
4. Finish filling up vial to the top and cap.
5. Invert vial and tap on hand and check for air bubbles
6. Hold time 14 days
7. 6 degrees C

25

## Collection – DBP's



**Bromide...120 ml plastic...no preservative...28 day hold time...ambient temp...fill to neck**

**Chlorate...120 ml plastic...0.12 ml 5% EDA (Ethylene Diamine)...28 day hold time...ambient temp...fill to neck...do not overfill**

**Chlorite...120 ml plastic...0.12 ml 5% EDA...14 day hold time...4 degrees C...fill to neck...do not overfill**

**Bromate...120 ml plastic or glass...0.12 ml 5% EDA...28 day hold time...ambient temp...fill to neck...do not overfill**

26

## Collection – SOC's



### Synthetic Organic Compounds

**Glyphosate...method 547...2 – 40 ml vials...thiosulfate preservation...14 day hold time...invert to guarantee no bubbles...<6 degrees C**

**Endothall...method 548.1...2 – amber glass 40 ml vials...thiosulfate preservation...7 day hold time...invert to guarantee no air bubbles...<6 degrees C**

**Diquat...method 549.2...500 ml amber plastic...thiosulfate preservation before collection, fill to bottom of neck, then add 1.5 ml 1:1 H<sub>2</sub>SO<sub>4</sub>, then fill to near top...do not overfill...7 day hold time...<6 degrees C**

27

## Collection – SOC's (con't)



**Pesticides/PCB's...method 505...2 – 40ml vials...thiosulfate preservative...keep air bubbles to a minimum...14 day hold time...<6 degrees C**

**Herbicides...method 515.3...2 – 120 ml amber glass...sodium sulfite preservation...14 day hold time...fill to neck...do not overfill...<6 degrees C**

**Semi-volatiles...method 525.2...2 – 1L amber glass...sodium sulfite before collection, fill to bottom of neck, add HCl, fill to near top...do not overfill...14 day hold time...<6 degrees C**

**Carbamates...method 531.2...2 – 40 ml amber vials...special carbamate preservation...do not overfill...28 day hold time...<6 degrees C**

**EDB/DBCP...method 504.1...2 – 40 ml vials...thiosulfate preservation...keep air bubbles to a minimum...14 day hold time...<6 degrees C**

28

## Collection – Taste & Odor



### MIB / Geosmin

1. 3 Glass 40 ml vials
2. Vials already contain sodium sulfite
3. Carefully add sample to vial using steady stream about the width of a pencil
4. Reduce flow when near the top of the vial
5. Fill to very top of vial without overfilling and cap
6. Invert vial and tap lightly on hand and view vial for the presence of air bubbles
7. No air bubbles may be present
8. <10 degrees C storage temp
9. Hold time is 3 days

29

## Collection – Algal Toxins



### Microcystins

1. 2 Amber Glass 40 ml vials
2. Vials already contain a mix of ascorbic acid, EDTA, trizma, and 2-chloroacetamide
3. Carefully add sample to vial using steady stream about the width of a pencil
4. Reduce flow when near the top of the vial
5. Fill to very top of vial and cap; do not overfill
6. Invert vial and tap lightly on hand and view vial for the presence of air bubbles
7. No air bubbles may be present
8. <10 degrees C first 48 hours, then <6 degrees C
9. Hold time is 28 days

30

## Collection – PFAS Compounds



### PFNA, PFOA, PFOS, etc

1. For method 537.1, 2 - 250 ml HDPE containers
2. Preservation is Trizma, which will already be in containers
3. Nitrile gloves **MUST** be worn during sample collection
4. Flush sample location for 10-15 minutes
5. Do not allow any item to contact inside of lid or around mouth of container
6. Carefully add sample using steady stream about the width of a pencil.
7. Fill to very top of container and cap; do not overfill
8. <10 degrees C first 48 hours, then <6 degrees C
9. Hold time is 14 days

31

## Collection – PFAS Field Blank



### PFNA, PFOA, PFOS, etc TB/FB/FTB

1. For method 537.1 FTB, 1 - 250 ml HDPE container
2. Preservation is Trizma, which will already be in container
3. Nitrile gloves **MUST** be worn during this procedure
4. Open the Field Trip Blank container provided
5. Do not allow any item to contact inside of lid or around mouth of container
6. Carefully open and add PFAS-free water from the container labeled 'Reagent Water' into the FTB container
7. Fill to top of container and cap; do not overfill
8. <10 degrees C first 48 hours, then <6 degrees C
9. Hold time is 14 days

32



## Collection – 25 PFAS Compounds



### Method 533

1. For new DW method 533, **3** - 250 ml HDPE containers
2. Preservation is ammonium acetate, which will already be in containers
3. Nitrile gloves **MUST** be worn during this procedure
4. Flush sample location for **10-15 minutes**
5. Do not allow any item to contact inside of lid or around mouth of container
6. Carefully add sample using steady stream about the width of a pencil
7. Fill to very top of container and cap; do not overfill
8. **<10 degrees C** first 48 hours, then **<6 degrees C**
9. Hold time is **28 days**

33

## Documentation & Delivery



Eaton Analytical**CHAIN OF CUSTODY RECORD**

Eurofins Eaton Analytical USE ONLY

<p>750 Royal Oaks Drive, Suite 100 Morrovia, CA 91016-3629 Phone: 626 386 1100 Fax: 626 386 1101 800 566 LABS (800 566 5227) Website: <a href="http://www.EatonAnalytical.com">www.EatonAnalytical.com</a></p>	<p>LOGIN COMMENTS: _____ SAMPLES CHECKED AGAINST COC BY: _____ SAMPLES LOGGED IN BY: _____</p> <p>SAMPLE TEMP RECEIVED AT: _____ °C (Compliance: 4 ± 2 °C) <input type="checkbox"/> Colton / No. California / Arizona _____ °C (Compliance: 4 ± 2 °C) <input type="checkbox"/> Morrovia _____ °C (Compliance: 4 ± 2 °C)</p> <p>CONDITION OF BLUE ICE: Frozen _____ Partially Frozen _____ Thawed _____ Wet Ice _____ No Ice _____</p> <p>METHOD OF SHIPMENT: Pick-Up / Walk-In / FedEx / UPS / DHL / Area Fast / Top Line / Other: _____</p>
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TO BE COMPLETED BY SAMPLER:

COMPANY/AGENCY NAME:	PROJECT CODE:	COMPLIANCE SAMPLES <small>(check for yes)</small>	NON-COMPLIANCE SAMPLES <small>(check for yes)</small>
EEA CLIENT CODE:	COC ID:	<input type="checkbox"/> <small>Requires state forms</small>	<input type="checkbox"/> <small>REGULATION INVOLVED: _____</small>
SAMPLE GROUP:	Type of samples (circle one): ROUTINE SPECIAL CONFIRMATION (eg. SCMA, Dioxin, PCBs, PAHs)		
<b>SEE ATTACHED BOTTLE ORDER FOR ANALYSES</b> <input type="checkbox"/> <small>(check for yes) OR</small>			
<small>list ANALYSES REQUIRED (enter number of bottles sent for each test for each sample)</small>			

SAMPLE DATE/TIME	SAMPLE ID	CLIENT LAB ID	MIXED	RECEIVED	RELEASED	ANALYSES		SAMPLER COMMENTS
						NO.	TEST	

\* MATRIX TYPES: RW – Raw Surface Water    CPW – Chloraminated Finished Water    SEAW – Sea Water    BW – Bottled Water    SO – Soil    O – Other - Please Identify  
RWG – Raw Ground Water    FW – Other Finished Water    WW – Waste Water    SW – Storm Water    SL – Sludge

SAMPLED BY:	DATE	TIME

PAGE \_\_\_\_ OF \_\_\_\_

34

## Chain of Custody Protocol



- 1. Name of facility / client name**
- 2. Sampling location**
- 3. Sampling date**
- 4. Sampling time**
- 5. Tests requested**
- 6. PWS#**
- 7. Signatures**
- 8. Comments for sample set**

35

## Documentation & Delivery



- ✓ **Documenting Field/Sample Conditions**
- ✓ **Storing Samples**
- ✓ **Packing and Breakage**
- ✓ **Temperature Management**
- ✓ **Timely Delivery**
- ✓ **Timely Processing**

36

## Sources of Lab Contamination



**Gas cylinders in the lab are one form of contamination.**



**Chemicals for the tests, including buffers, must be made fresh as per described by the methodology.**

37

## Sources of Lab Contamination



**Instrumentation must be kept clean and no leak detections.**



**Dust accumulation around all lab testing counters, floors, shelving, sinks, etc.**

38

## Sources of Lab Contamination



**Hoods must be kept clean and be known to be in perfect working condition.**



**Sample waste must be disposed of properly and be out of all lab testing areas.**

39

## Conclusion



- 1. Maintain Sample Sites**
- 2. Calibrate Equipment**
- 3. Inventory Sample Kits**
- 4. Stage and Organize**
- 5. Take Your Time**
- 6. Document Everything**

40

**Thank You!**



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41

**Questions ?**



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42