

# Common Sampling & Lab Mistakes

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A decorative graphic consisting of several horizontal lines of varying lengths and colors (teal, light blue, white) extending from the right side of the slide.

# Topics of Discussion

- Safety
- Sampling Technique
- Sampling Equipment
- Laboratory Equipment
- Sample Contamination
- Calculations
- Reporting

nobody  
is PERFECT

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# Safety



# Safety Mistakes Could Cause

- Lost revenue
- Lost wages
- Lost time at work
- Lost jobs
- *Loss of LIFE!*



# Common Safety Mistakes

- Slips, trips, and falls
- Muscle strains
- Being hit by falling objects
- Crashes and collisions
- Cuts and lacerations



# How To Avoid Safety Mistakes

- Always have the right equipment for the job.
- Wear the correct PPE for the job.
- Know your surroundings and be alert at all times.
- Know when to ask for help.
- Have first aid kits available and have at least one employee with CPR/First Aid training.
- Have an emergency plan in place and know who to contact if there is an emergency or accident.

# In the Field

- Use manhole cover lifters.
- If working near water, have a life jacket or other appropriate device.
- Carry flares or other attention grabbing devices if working alongside roadways.
- Wear hard hats and ear protection when required.
- Work in pairs if possible.



# Check Your Surroundings





# In the Lab

- Wear lab coat, safety glasses, and gloves whenever handling samples or chemicals.
- Properly label and store chemicals.
- Make sure Material Safety Data Sheets are easily accessible.
- Know where eye wash stations, safety showers, and spill kits are located and how to use them.
- Keep break areas separate from lab workspaces.
- Keep areas clear of tripping or slipping hazards.

# Sampling Technique

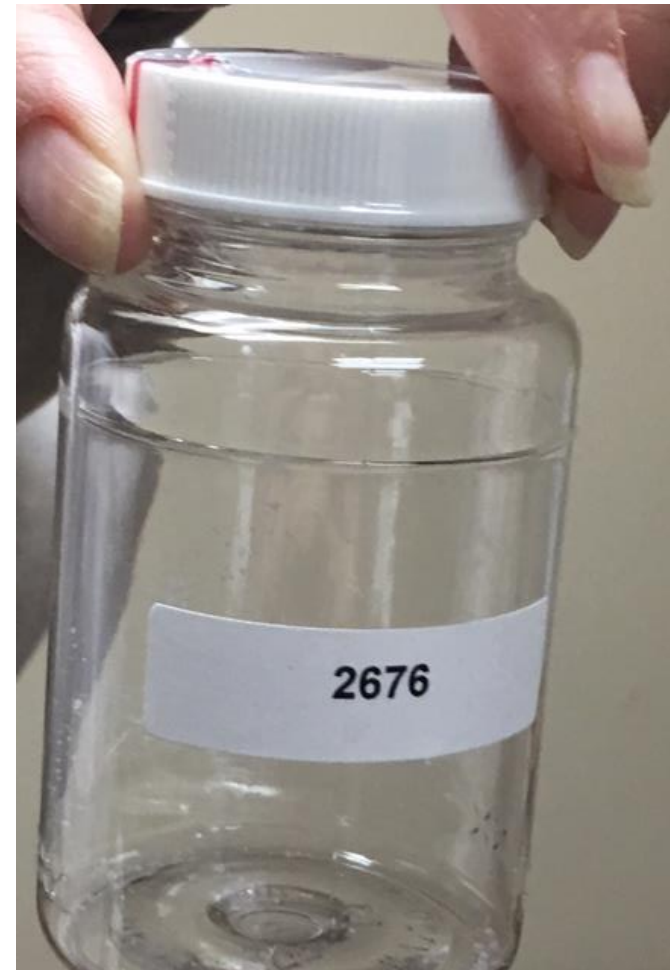


# Proper Sampling Techniques

- Depends on the type of sample you're collecting (grab, composite, first-draw, etc.).
- Depends on the parameters you're testing.
  - Microbiological
  - Copper and Lead
  - Volatile Organic Compounds

# Microbiological Samples

- Select a tap (do not use swivel taps) and remove screens.
- Sanitize the tap.
- Flush tap for 3-5 minutes, then reduce flow for collection.
- Completely remove the wrap around the bottle cap.
- Fill bottle to neck but avoid over-filling.
- Immediately recap the bottle.



# Lead and Copper

- Must be collected in a quart-size (1L) container for compliance purposes.
  - Leave some headspace to ensure proper mixing.
- Per EPA requirements, these must be first draw.
- All operators and PWS staff responsible for compliance monitoring should read the EPA guidance documents and reporting requirements concerning lead and copper.

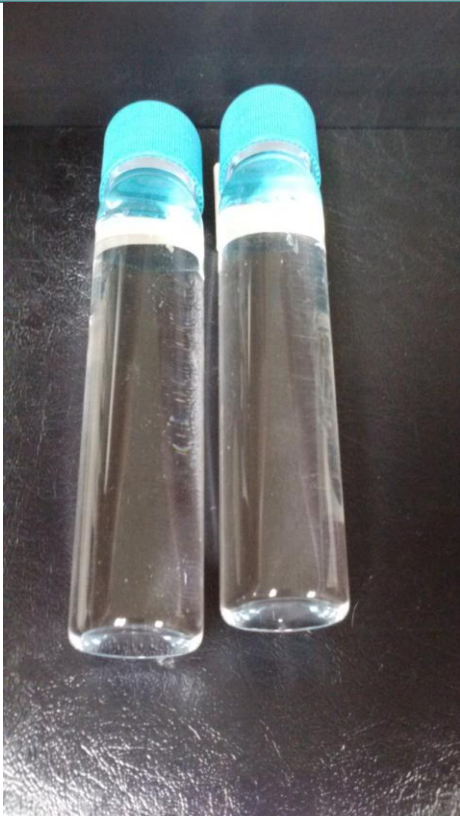


# Volatile Organic Compounds

- Reduce water flow so vials can be filled without splashing and to reduce air bubbles.
- It is key that you don't have any air bubbles and you don't overfill the vials.
- Recommend filling 3-4 vials per sample.

# Volatile Organic Compounds

**CORRECT**



**INCORRECT**



# Resources

- EPA’s “Quick Guide to Drinking Water Sample Collection”
  - [https://www.epa.gov/sites/production/files/2015-11/documents/drinking\\_water\\_sample\\_collection.pdf](https://www.epa.gov/sites/production/files/2015-11/documents/drinking_water_sample_collection.pdf)
- OEPA’s “Surface Water Field Sampling Manual”
  - <https://www.epa.ohio.gov/Portals/35/documents/SW-Sampling-Manual-2018.pdf>
- OEPA’s “Technical Guidance Manual for Ground Water Investigations”
  - [https://www.epa.ohio.gov/portals/28/documents/TGM-10\\_final0206W.pdf](https://www.epa.ohio.gov/portals/28/documents/TGM-10_final0206W.pdf)



# Sampling Equipment



# Tap Selection

- Cold water faucet free of screens, aeration devices, hoses, water softeners, and purification devices.
- Avoid swiveled faucets.
- Faucet should be high enough that sample bottle will fit underneath without contacting the faucet.

# Sampling Equipment

- Sampling pole
- Scoops
- Bailers
- Pumps
- Automatic samplers



# Sample Bottles

- Make sure you have the correct sample bottles and label them with as much information as possible before sampling.
- Bottle materials:
  - Glass (clear borosilicate or amber)
  - Plastics (HDPE, PTEG)
  - Fluoropolymer
  - Sterilized



# Sample Preservation

- Preservations
  - Non-preserved
  - Acids
  - Bases
  - Dechlorinating agents
  - Thermal
- For the Ohio DW program, samples will be rejected if they do not meet preservation requirements upon receipt at the lab.
  - Only exception is metals.

# Sample Preservation

- Three different types of sample bottles for VOCs:
  - Chlorinated Regulated/Full List VOCs
    - Ascorbic acid
    - HCl (added to the vials in the field)
  - Unchlorinated Regulated/Full List VOCs
    - HCl
  - Trihalomethanes (TTHMs)
    - Sodium thiosulfate

# Laboratory Equipment



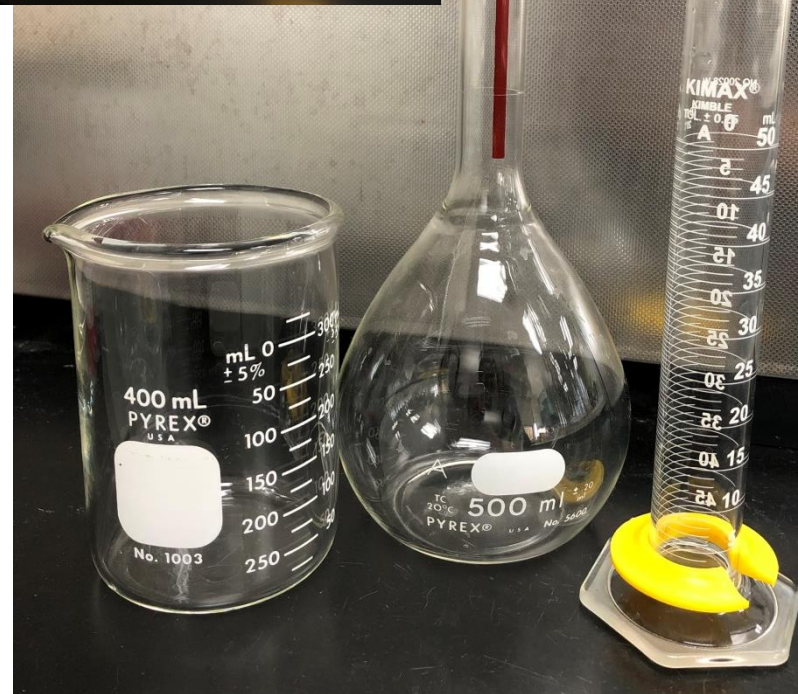
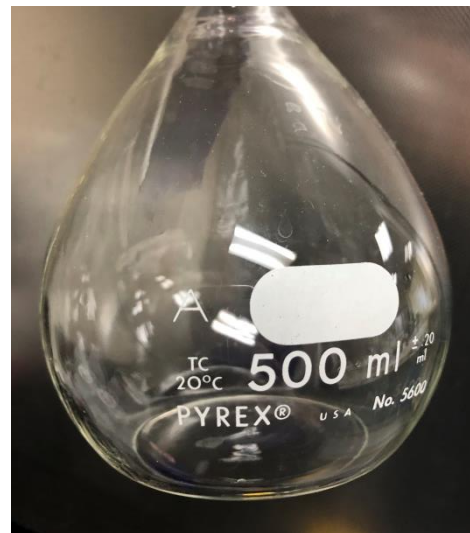
# Standards

- All reagents and solutions should be labeled, stored, and disposed of correctly.
- Check reagent Certificates of Analysis for the:
  - Chemical name
  - Concentration
  - Purity
  - Expiration date
  - Storage instructions
- Check reagent and solution expiration dates before each use.



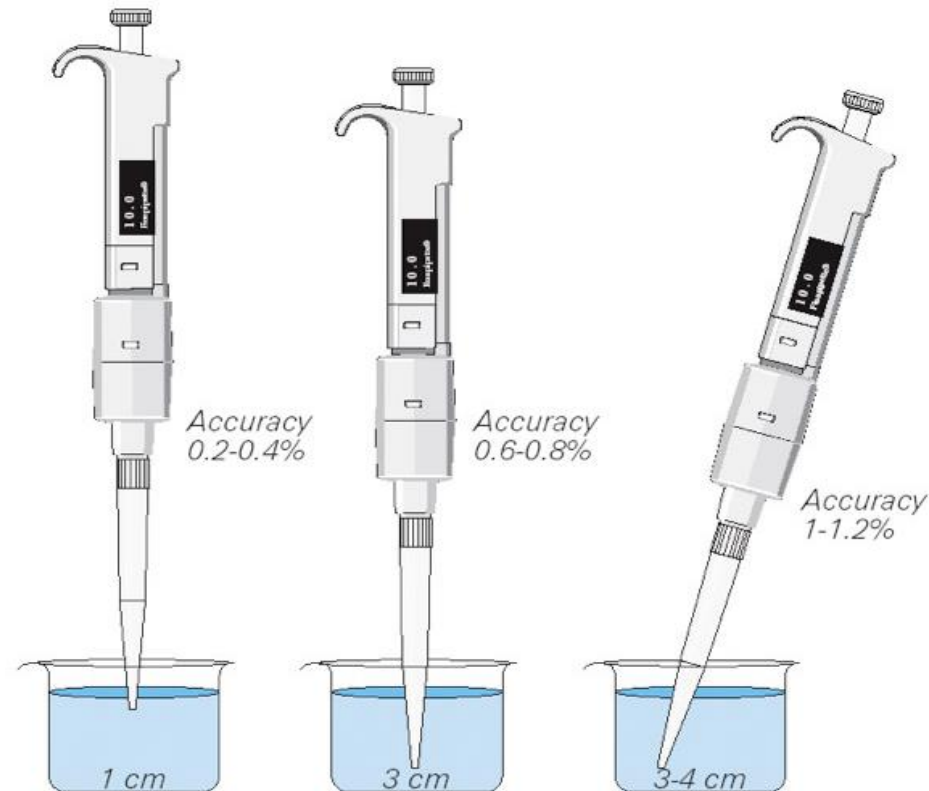
# Glassware

- Use the correct glassware for the task you are performing.
  - TD vs. TC
  - Class “A”
- Make sure all glassware is properly cleaned and stored between uses.



# Pipettes

- Use the correct pipette type for the task.
  - Never pipette by mouth!
- Use the correct pipetting method.
- Pipettes should be regularly inspected and calibrated.



# Balances

- Should be located in an area free of external interferences such as:
  - Airflow
  - Vibrations
  - Electrostatic forces
- Should be calibrated and verified regularly.
- Should be kept level and clean.

# Meters

- Could include:
  - Temperature gun
  - pH/TDS/Conductivity meter
  - Chlorine meter



# Meters

- Check meter settings and units.
- Calibrate meters periodically.
  - Frequency depends on OEPA requirements first and foremost. If not provided, use the manufacturer's recommended frequency.
- Verify the meter is working correctly prior to daily use.
- Keep meters clean and store them properly between uses.
- Have a logbook for recording calibration and maintenance information.

# Sample Contamination



# Sources of Contamination

- Material is **IMPORTANT!**
  - Sampling pole and collection bottle
  - Tubing for auto samplers
  - Vessel for auto sampler
  - Caps for bottles (lined or unlined)
  - Soap to clean auto samplers, filtering apparatus, and glassware
  - Gloves being worn

# Sources of Contamination

- Sterilization is one of the most missed steps in sample collection.
- All materials should be cleaned:
  - Auto sampler and auto sampler tubing
  - Filtering apparatus
  - Taps
  - Sampling poles/collection vessels
  - Laboratory workspaces



# Sources of Contamination

- Clean hands thoroughly and wear gloves.
- Wear clean clothes or Tyvek suit.
- Pull long hair back and secure.
- Wear face masks when practical.
- Avoid smoking and vehicle exhaust.
- Keep bottles tightly capped before and after sampling.

# How to Check for Contamination

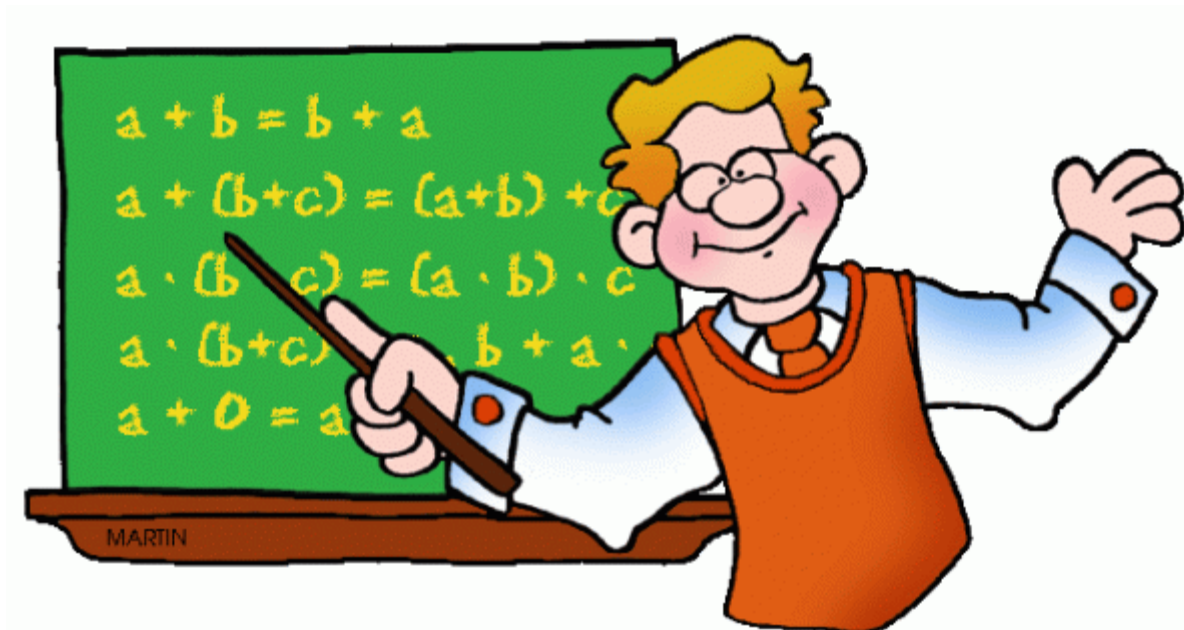
- There are many types of blanks that can be analyzed to determine if contamination is introduced in the field or lab.
  - Trip Blank
  - Field Blank
  - Equipment Blank
  - Filter Blank
  - Method Blank
  - Laboratory Blank

# Calculations



# Calculations

- Always know how to perform calculations by hand, but creating spreadsheets and protecting cells can be a useful tool.



# Calculation Spreadsheets

- Creating and sharing spreadsheets allows for consistency of results and can eliminate human error.
- Spreadsheets should be verified periodically as part of the QA/QC program and should be spot checked regularly during data review.

# Conversions

- Make sure the units of measurement match the required reporting units.
- Understand common units and conversions.
  - $\text{ppm} = \text{mg/L}$
  - $\text{ppb} = \mu\text{g/L}$
  - $1 \text{ mg/L} = 1,000 \mu\text{g/L}$

# Reporting



# Understand Your Monitoring Schedule

- <https://epa.ohio.gov/ddagw/pws#129177381-current-monitoring-schedules>
- Know the exact locations for collections (LT2, LC, DS, EP, etc.).
- Know the frequency of monitoring for contaminants (daily, weekly, monthly, etc.).
- Know your time frame.



OH [REDACTED]

System Type: Community

Operating Period: 1/1 to 12/31

**ENTRY POINT MONITORING SCHEDULE**

Sampling Location	Facility ID: [REDACTED] SMP ID: EP001	Facility Name: [REDACTED] Facility Source: Surface Water	Facility Class: CLASS 3
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THIS SCHEDULE MAY NOT INCLUDE ALL MONITORING REQUIREMENTS FOR YOUR SYSTEM.  
Contact your district office to review additional monitoring for operating parameters, and/or other monitoring requirements not included on this schedule.  
Also, monitoring schedules may be revised during the year based on sampling results.

For water emergencies that occur after hours, please call 800-282-9378

\*\* REMINDER: \*\* Consumer Confidence Report (CCR) is due July 1, 2019

**Chemicals**

**Monitoring Requirements**

INORGANICS 1 Sample(s) Required between 1/1/2019 and 5/31/2019

Sample for all the analytes listed below:

ANTIMONY, TOTAL - 1074 ARSENIC - 1005 BARIUM - 1010 BERYLLIUM, TOTAL - 1075 CADMIUM - 1015 CHROMIUM - 1020  
CYANIDE - 1024 FLUORIDE - 1025 MERCURY - 1035 NICKEL - 1036 SELENIUM - 1045 THALLIUM, TOTAL - 1085

NITRITE - 1041 Not Required

NITRATE - 1040

1 Sample(s) Required between	1/1/2019 and	1/31/2019
1 Sample(s) Required between	2/1/2019 and	2/28/2019
1 Sample(s) Required between	3/1/2019 and	3/31/2019
1 Sample(s) Required between	4/1/2019 and	4/30/2019
1 Sample(s) Required between	5/1/2019 and	5/31/2019
1 Sample(s) Required between	6/1/2019 and	6/30/2019
1 Sample(s) Required between	7/1/2019 and	7/31/2019
1 Sample(s) Required between	8/1/2019 and	8/31/2019
1 Sample(s) Required between	9/1/2019 and	9/30/2019
1 Sample(s) Required between	10/1/2019 and	10/31/2019
1 Sample(s) Required between	11/1/2019 and	11/30/2019
1 Sample(s) Required between	12/1/2019 and	12/31/2019

RADIOLOGICALS Not Required

SYNTHETIC ORGANIC CHEMICALS (SOC) GROUP 1 1 Sample(s) Required between 4/1/2019 and 6/30/2019

Sample for all the analytes listed below:

ALACHLOR (LASSO) - 2051 ATRAZINE - 2050 SIMAZINE - 2037

VOLATILE ORGANIC CHEMICALS (VOC) 1 Sample(s) Required between 1/1/2019 and 5/31/2019

# Know the Reporting Requirements

- For laboratory reporting to PWS and OEPA:
  - 10 days following completion of analysis.
  - Pb/Cu results, MCL violations, positive microbiological or resample results, and microcystin/qPCR detections must be reported to the OEPA by end of next business day.

# Know the Reporting Requirements

- PWS reporting to public and OEPA:
  - Monthly Operating Reports (MORs)
    - 10 days after the end of each month.
  - Water Quality Parameters
    - 10 days after the month when PWS received sample results from laboratory.

# Ensure Data is Reported on Time

- Indicate what type of sample you collected on the COC or SSR form (start up, routine, resample, compliance, special purpose, etc.).
- Include all information needed to submit results to OEPA:
  - PWS ID
  - Facility ID
  - Sample ID



# Additional Solutions



# Additional Solutions

- Training is key!
  - Cover all aspects of sampling or analysis with new personnel during training.
  - Training should be an ongoing process.
- Keep up to date with new technologies, analytical methods, and monitoring requirements.

# Additional Solutions

- Implement programs to ensure Good Laboratory Practices are being performed.
- If using outside laboratories, communicate with them regularly.
- Ask questions.