Water Quality Monitoring Field Manual

"to once again drink water directly from the Yukon River as our ancestors did"

Yukon River Inter-Tribal Watershed Council • 2011

ONE PEOPLE-ONE RIVER

Yukon River Inter-Tribal Watershed Council

Overview

This manual is designed to be used as a reference tool for technician's conducting water sampling under YRITWC protocols. The YRITWC protocols were developed using the United States Geological Survey (USGS) protocols as a bench mark for quality (USGS, TWR Book 9). The structure set forth here will be one that focuses on end-user functionality.

Through out the manual key points will be noted with special characters and text boxes in the body of the text. This will highlight essential material, as well as give resources for additional research.

Equipment

There are a number of different manufacturers of water quality instruments currently on the market. Manufacturers include; Hydrolab, YSI Inc., Eureka, Oakton, Hanna, Hach and Daigger. Each manufacture produces a number of types of equipment, from single parameter probes to multi-parameter sonde's*. The level of sophistication of each probe depends on the type of parameters being measured and the needs of the user. The type of probe selected for each instance will depend on the time and frequency of data collection. Currently the YRITWC program uses probes from two manufacturers, YSI Inc. and Hanna.

*If you are considering buying equipment for your IGAP program please talk with the YRITWC Science Department staff and we will be glad to explore options on equipment that will fit the long term needs of your community.

Calibration

Calibration can be defined as the act of calibrating an instrument or experimental reading in order to correlate the readings of the instrument with those of a known standard, to check the instruments accuracy. Adequate documentation of standards and procedures can not be understated! Correctly following the calibration procedures and providing accurate documentation, allows the data to be checked using quality assurance methods. Instrument calibration data is essential to assuring the data is of high quality.

The calibration of equipment is essential to collecting field measurements accurately!

Jon Waterhouse downloading water quality data during the *The 2007 Healing Journey*.

Dave Pelunis-Messier paddling the Yukon River, above Russian Mission.

Calibration Conductance:
Hanna Pocket Meter

1. Rinse one jar with a small amount of Conductance standard - 1413µS*. Fill the jar halfway with the conductance standard.
2. Press the Set/Hold to change modes. In the upper right hand corner of the display "µS"** will appear; indicating the specific conductance mode.
3. Rinse the tip of the meter with a small amount of conductance standard 1413.
4. Hold down the Power/Mode button until "CAL" appears. Release the button immediately when "CAL" appears.
5. The screen will display "1413 USE"
6. Place the tip of the meter in the conductance standard 1413.

7. When the screen <u>does not</u> display "USE" the calibration is complete. Record the displayed conductance & temperature values on the Hanna meter section of the Field Sheet.

. Rinse the tip of the meter with water and replace the cap.

*The Hanna Meter will always use the 1413 conductivity standard.

** Microsemens (µS) is a unit of measurement for the electrical conductance of water. It is essentially a measure of the total amount of solutes in the water.

Calibration pH: Hanna Pocket meter

1. Rinse the 2 jars that will be used for pH calibration. Rinse one jar with a small amount of pH 7, rinse the other jar with small amount of pH 10.

2. Place approximately 2 inches of pH 7 solution in the pH 7 jar. Place approx. 2 inches of pH 10 solution in the pH 10 jar.

3. Power on the unit by pressing the Power/Mode button. Wait for the unit to fully power on.

4. Press the Set/Hold button to change the display to pH. In the upper right corner of the display a "pH" will appear.

5. Remove cap from meter

6. Press and hold down the Power/Mode button. "OFF" will appear on the screen, keep holding down the button until "CAL" appears on the screen. Release the button immediately when "CAL" appears. "USE" will appear at the bottom of the screen.

7. Rinse the meter tip with a small amount of pH 7, place the meter in the pH 7 when "USE" is displayed on the bottom of the screen.

8. When the screen displays "4.01 USE" rinse the tip of the meter with a small amount of pH 10.

9. Place the tip of the meter in the pH 10 jar. The meter will automatically calibrate to pH 10. After a few seconds the display will read 10.03 or very close to this number. Record this number under the Hanna meter calibration section of the field sheet*. The pH calibration is now complete.

* An example of the field sheet is included at the end of the manual.

Calibration Conductance: YSI 63

Prior to calibration of the YSI Model 63, it is important to remember the following:

•Always use clean, properly stored, calibration solutions. When filling a container for the calibration procedures, make certain that the level of conductance solution is high enough in the container to cover the entire probe. Gently agitate the probe to remove any bubbles in the conductivity cell.

• Rinse the probe with distilled water (and wipe dry) between changes of calibration solutions.

• During calibration, allow the probe time to stabilize with regard to temperature (approximately 60 seconds) before proceeding with the calibration process. The readings after calibration are only as good as the calibration itself.

• Perform conductivity calibration at a temperature as close to 25°C as possible. This will minimize any temperature compensation error.

Follow these steps to perform an accurate conductivity calibration of the YSI Model 63:

Turn the instrument on and allow it to complete the self test procedure.

1. Place at least 7 inches of 1413 Conductance solution in the plastic container (provided with the Model 63) or a clean glass beaker.

> **NOTE: Do NOT use the 100 mL graduated cylinder**. The diameter of the cylinder is too small for accurate conductivity measurements.

2. Use the MODE key to advance the instrument to display specific conductivity. Look for the "µs" and flashing °C on right corner of the screen.

3. Insert the probe into the solution deep enough to completely cover the probe. Both conductivity ports must be submerged.

4. Move the probe vigorously from side to side to dislodge any air bubbles from the electrodes.

5. Allow at least 60 seconds for the temperature reading to become stable.

6. Press and release the UP ARROW and DOWN ARROW keys simultaneously. The CAL symbol will appear at the bottom left of the display to indicate that the instrument is now in calibration mode.

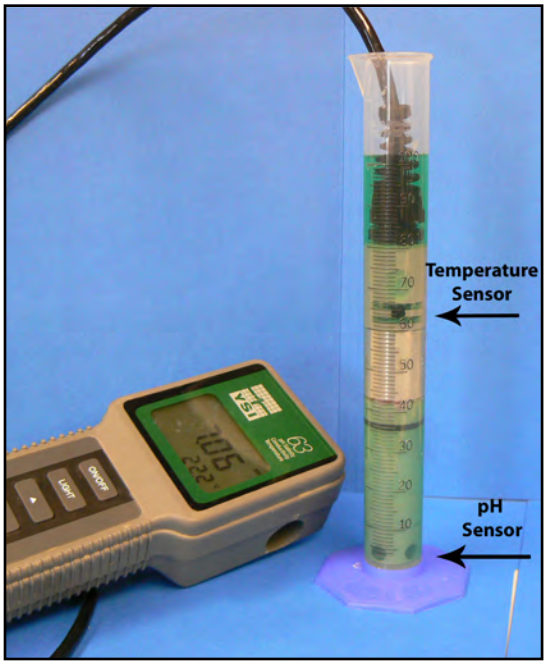
7. Use the UP ARROW or DOWN ARROW key to adjust the reading on the display until it matches the value of the calibration solution you are using. Typically this will be the 1413 Conductance solution. Record the conductivity standard used on the field sheet.

8. Once the display reads the exact value of the calibration solution being used press the ENTER key (the instrument will make the appropriate compensation for temperature variation from 25°C).

9. The word “SAVE” will flash across the display for a second, indicating that the calibration has been accepted. Record the displayed conductivity & temperature values on the “Conductance Calibration” section of the field sheet.

Calibration pH: YSI 63

1. Turn the instrument on by pressing the ON/OFF key. Press the MODE key until pH is displayed.
2. Rinse the probe with deionized or distilled water, then carefully remove excess water with a chem-wipe (or rinse with some of the pH buffer solution to be used for calibration).
3. Place 30 to 35 mL of the pH 7 buffer in the 100 mL graduated cylinder. The graduated cylinder minimizes the amount of solution needed. Immerse the probe making sure that both the pH and temperature sensors are covered by the solution.



4. To enter the calibration menu, use two fingers to press and release both the UP ARROW and DOWN ARROW keys simultaneously. The Model 63 display will show “CAL” at the bottom, “STAND” will be flashing and the pH reading will show “7.00”.
5. Press the ENTER key. The display will show “CAL” at the bottom, “STAND” will stop flashing and the pH calibration value is shown with the middle decimal point flashing.
6. When the reading is stable, the decimal point will stop flashing. Record this pH value in the “pH 7 buffer reading” section of the field sheet. Press and hold the ENTER key to save the calibration point. The display will flash “SAVE” on the screen along with “OFS” to indicate that the offset value has been saved.
7. “SLOPE” will now appear on the screen and be flashing. This indicates that the slope is ready to be set using a second pH buffer. The system is now calibrated at a single point.
8. Rinse the probe with deionized or distilled water, removes excess water with chem-wipe. Rinse the probe with a small amount of pH 10 buffer.
9. Fill a clean graduated cylinder with a small amount of pH 10 buffer. Rinse and discard the buffer. Fill the container with 30-35mL of the pH 10 buffer and im-

merse the probe into the solution. Make sure that the temperature sensor is immersed.

10. Press the ENTER key. The screen should now show “CAL” at the bottom, “SLOPE” will stop flashing and the next pH calibration value is shown with one of the decimal points flashing. The right decimal point will flash, indicating the second buffer is greater than the first. If the second pH buffer is less than the first buffer , the left decimal point will flash.

11. When the reading is stable (no change in 10 seconds), the decimal point will stop flashing. Record this pH value in the “pH 10 buffer reading” section. Press and hold the ENTER key to save the calibration. The display will flash “SAVE” on the screen along with “SLP” to indicate that the first slope value has been saved.

12. “SLOPE” will start flashing again indicating that the slope is ready to be set using a third pH buffer, if necessary.

13. The system is now calibrated at two points. For our purposes a 2-point calibration using pH 7 and pH 10 is sufficient*. Press the MODE key to return to normal operation.

14. Rinse the probe with deionized or distilled water, then carefully dry the probe & store.

*A third calibration point can be calculated using the pH 4 buffer, following the steps outlined above. This would be necessary if the general range of pH in the sample is not known (YSI Operations Manual, pg.31 online). For our studies in the Yukon River Basin, the general range will be between 6 and 10.

Calibration pH: YSI 600 series

1. Using approximately 50 mL of pH 7 buffer in a clean, dry and pre-rinsed calibration cup, carefully immerse the probe end of the Sonde into the solution. Allow at least one minute for temperature equilibration before proceeding.

2. In the Main Menu select Sonde menu. From the Calibrate menu, select ISE1 pH to access the pH calibration choices and then select 2-Point.

3. Press Enter and input the value (Chart 1), appropriate for the temperature, of the buffer at the prompt*. Press Enter and the current values of all enabled sensors will appear on the screen, allow stabilization in the solution. Observe the readings of pH; when they show no significant change for approximately 30 seconds, press Enter.

4. Press Enter again, the display will indicate that the calibration is accepted. Record the pH reading in the "calibration" section of the field sheet.

5. After the pH 7 calibration is complete, press Enter again, saving the calibration. Rinse the Sonde in deionized or distilled water before proceeding to the next step.

6. Using approximately 50mL of pH 10 buffer in a clean, dry and pre-rinsed calibration cup, carefully immerse the probe end of the Sonde into the solution. Allow at least one minute for temperature equilibration before proceeding.

7. Press Enter and input the value (Chart 2) of the second buffer at the prompt. Press Enter and the current values of all enabled sensors will appear on the screen and will change with time as they stabilize in the solution. Observe the readings under pH and when they show no significant change for approximately 30 seconds, press Enter.

* Use the Buffer Solution Temperature Charts located at the end of the manual to determine the corresponding value to temperature. EXAMPLE: If the pH 7 buffer solution is at a temperature of 41°F/5°C then the pH value entered would be 7.09

8. After the second calibration point is complete, press Enter again, as instructed on the screen, to return to the Calibrate menu.
9. Rinse the Sonde in deionized or distilled water and dry. Thoroughly rinse and dry the calibration containers for future use.

NOTE: The majority of all types of environmental water has a pH between 7 and 10, therefore, unless you anticipate a pH of less than 7 for your application, a two-point calibration using pH 7 and pH 10 buffers can be used.

Conductance Calibration: YSI 600 series

1. This procedure calibrates conductivity, specific conductance, salinity, and total dissolved solids.
2. Place 350 mL of 1413 µS/cm conductivity standard into a clean, dry and pre-rinsed calibration cup.
3. Before proceeding insure that the sensor is as dry as possible. Ideally, rinse the conductivity sensor with a small amount of standard that can be discarded. Make certain that there are no salt deposits around the oxygen and pH/ORP probes, particularly if you are employing standards of low conductivity.

Be certain that you avoid cross-contamination of standard solutions with other solutions!

4. Carefully immerse the probe end of the Sonde into the solution. Gently rotate and/or move the Sonde up and down to remove any bubbles from the conductivity cell. The probe must be completely immersed past its vent hole. Using the recommended volume, stated above, should insure that the vent hole is covered.
5. Allow at least one minute for temperature equilibration before proceeding.
6. From the Calibrate menu, select Conductivity to access the Conductivity calibration procedure and then 1- SpCond to access the specific conductance calibration procedure. Enter the calibration value (Chart 3) of the standard being used (*mS/cm at 25°C) and press Enter. The current values of all enabled sensors will appear on the screen and will change with time as they stabilize.

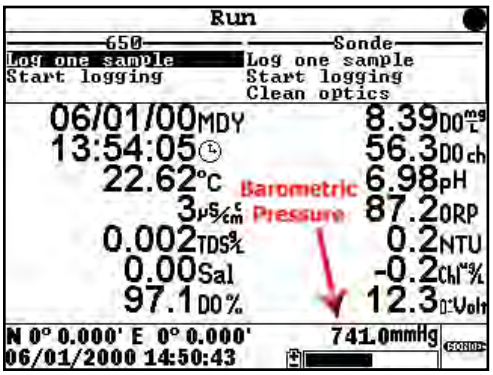
7. Observe the readings under Specific Conductance or Conductivity and when they show no significant change for approximately 30 seconds, press Enter. The screen will indicate that the calibration has been accepted. Record the specific conductance value on the field sheet in the "calibration" section. Press Enter again to return to the Calibrate menu.

*This YSI meter uses mS/cm for calibration, the conductivity standard typically used will be in µS/cm. 1mS/cm = 1000µS/cm Moving the decimal left 3 spaces will give you the standard in mS/cm. EXAMPLE: 1413µS/cm = 1.413mS/cm

Calibration Dissolved Oxygen: YSI 600 series

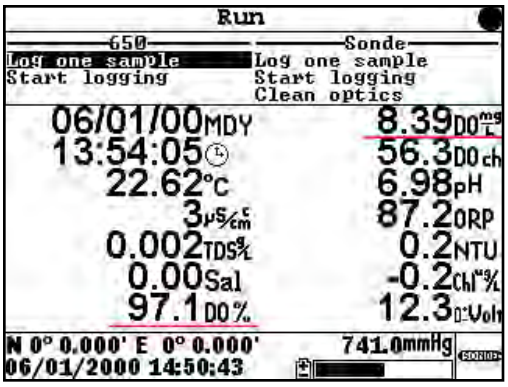
1. Place approximately 3 mm (1/8 inch) of water in the bottom of the calibration cup. Place the probe end of the Sonde into the cup. Make certain that the DO and temperature probes are not immersed in the water. Engage only 1 or 2 threads of the calibration cup to insure the DO probe is vented to the atmosphere. Wait approximately 10 minutes for the air in the calibration cup to become water saturated and for the temperature to equilibrate.
2. From the Calibrate menu, select Dissolved Oxy, then 1-DO % to access the DO percent calibration procedure. Calibration of dissolved oxygen in the DO % procedure also calibrates DO mg/L and vice versa.
3. Enter the current Barometric Pressure (BP) in mmHg. Also, record the barometric pressure value on the field sheet.

Inches of Hg x 25.4 = mm Hg



Note: Laboratory barometer readings are usually “true” (uncorrected) values of air pressure and can be used “as is” for oxygen calibration. Weather service readings are usually not “true”, i.e., they are corrected to sea level, and therefore cannot be used until they are “uncorrected”. An approximate formula for this “uncorrected” (where the BP readings MUST be in mm Hg) is:

$$\text{True BP} = [\text{Corrected BP}] - [2.5\ (\text{Local Altitude}/100)]$$



4. Press Enter and the current values of all enabled sensors will appear on the screen and change with time as they stabilize. Observe the readings under DO%. When they show no significant change for approximately 30 seconds, press Enter. The screen will indicate that the calibration has been accepted. Record the reading on the field sheet in the calibration section. Press Enter again to return to the Calibrate menu.

5. Rinse the Sonde in distilled or deionized water and dry the Sonde.

BEFORE YOU CALIBRATE

To accurately calibrate the YSI 550A, you will need to know the following information:

•The approximate salinity of the water you will be analyzing. Fresh water has a salinity of approximately zero. Seawater has a salinity of approximately 35 parts per thousand (ppt).

•For calibration in % saturation mode, the approximate altitude (in feet) of the region where you are located is required. This information can be obtained over the internet or from a local airport or weather station. To convert from meters to feet, divide by 0.3048.

For best results:

•Check calibration with each use and recalibrate as necessary to prevent drift. Dissolved oxygen readings are only as good as the calibration.

CALIBRATION IN % SATURATION

1. Ensure that the sponge inside the instrument's calibration chamber is moist. Insert the probe into the calibration chamber.
2. Power the instrument on and allow readings to stabilize. This may take 5 to 15 minutes, depending on the age of the instrument and condition of the probe.
3. Press and release both the UP ARROW and DOWN ARROW keys at the same time to enter the calibration menu.
4. Press the Mode key until "%" is displayed on the right side of the screen for oxygen units. Press ENTER.
5. The LCD will prompt you to enter the local altitude in hundreds of feet. Use the arrow keys to increase or decrease the altitude. When the proper altitude appears on the LCD, press the ENTER key.

   EXAMPLE: Entering the number 1 = 100 feet, 10 = 1000ft etc.
6. CAL will now display in the lower left corner of the screen, the calibration value in the lower right corner and the current DO reading (before calibration) will be the main display. Once the current DO reading is stable, press the ENTER button.
7. The LCD will prompt you to enter the approximate salinity of the water you are about to analyze. You can enter any number from 0 to 70 parts per thousand (PPT) of salinity. Use the arrow keys to increase or decrease the salinity setting. When the correct salinity appears on the LCD, press the ENTER key. The instrument will return to normal operation. (Note: The salinity will be zero for most of our river applications.)

How to Sample

Ade-quate docu-mentation is of the utmost im-

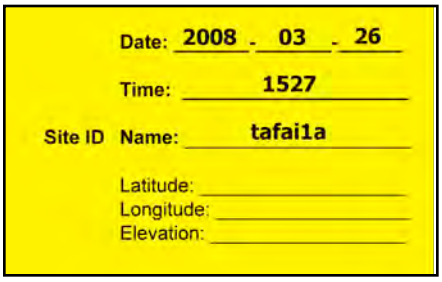
Field sheet documentation:

Date and Time

In order to work toward the standardization of protocols across the watershed, the YRITWC Science Department utilizes the International Standards Organization (ISO) standard for date and time records. This standard is accepted as the format for international trade. In our application it can be viewed as, Indigenous peoples of the Yukon Basin are engaging in the trade of information to sustain their traditional way of life.

The international standard for recording the date, as set by the ISO, ranks the priority of information from the most important to least important; the year being the most important, the month being second in priority, and the day being of the lowest priority. The format for the date would be; yyyy-mm-dd. This format should be used when recording the date on the field sheet and sample bottles.

The use of 24-hour time is standard practice in scientific data collection. The use of 24-hour time reduces the potential for transmission error when recording field data into a data base and allows for accurate record keeping when samples are taken at multiple times in a single day. On the field sheet record the time that you begin taking your water sample. Use this same time for documentation throughout the duration of your samples (i.e. labeling bottles).



Naming Convention

The naming convention was developed as a method to efficiently identify the river, the community, and the site in a single unit. The structure of the system is in four distinct parts. First, the river is identified using the first 2 letters of the river from which the sample was taken. Second, the community is identified by the three letter airport code from where the sample will be shipped. Third, the site number is identified using chronological numbers starting at 1. The forth

component is the letter “a” or “b” which identifies the site as being above the community, “a”, or below the community, “b”, from where the sample was taken.

An example of the naming convention would be; Tannana River (**ta**), Fairbanks (**fai**), site number (**1**), above Fairbanks (**a**). This site would be written on the field sheet as; **tafai1a**.

A list of the current sites can be found at the end of the manual, in Table 1. The sites in the table are listed from upper river to lower river.

Yukon River sunset.

Sample Gear Check List: Open Water

1. Meter(s)
2. Sample kit (with frozen ice pack)
3. Thermometer
4. Field Sheet
5. Clip board (with pencil)
6. Sample holding bottle
7. Syringe & filters
8. Life jacket
9. GPS

Sample Gear Check List: Under Ice

1. Meter
2. Sample kit (with frozen ice pack)
3. Thermometer
4. Field Sheet
5. Clip board (with pencil)
6. Sample holding bottle
7. Life jacket
8. GPS
9. Sample bulb pump (with hose)
10. Ice Auger

Sample Procedures

From Boat:

Pick a location where river flow is not contaminated by upstream point source pollution (sewage effluent, docks, boat landings, bridges, etc). It is preferred that you chose a site located above your community. Position the boat as close to center of the river as possible pointing the bow upstream and holding the same position. If the river velocity is high, you may have to let the boat drift with the current. Make all field measurements upstream from the boat and away from the motor, if the boat is equipped with one.

From River Bank:

Pick a location where river flow is not affected by eddies (straight river reach) or contaminated by upstream point source pollution (sewage effluent, docks, boat landings, bridges, etc). Wade out into current as far, but as safely as possible. Always make field measurements with probes positioned upstream of you!

All results, field measurements and observations, should be written down on the data sheets.

Use your handheld meter to sample:

Water Temperature: Open Water

Take the water temperature reading from the same location the sample was collected. Though this method is ideal, it may not be possible depending on equipment. If taking the sample from the same location is not possible, then measure the temperature of the water from a holding bottle as soon as the container has a sufficient amount of water to make a measurement, aprox. 200-1000 mL. Record the water temp on the field sheet.

Under Ice

The procedure of collecting under ice water temperature is the same as during the open water season. The water will likely be very close to 0°C.

pH and Conductance: Open Water

The best readings will be from where the sample was collected. This may not be possible depending on equipment. The next best measurement will be from the holding bottle. Using glass or plastic beakers/cups, pour just enough to get the measurements (500-1000 mL). Record the pH and conductance on the field sheet.

Under Ice

Using the YSI 63, lower the meter into the ice hole and allow it to acclimate in the water for a couple minutes. Record the reading for pH and conductance on the field sheet.

When using the Hanna pocket meter do not measure pH and conductance in the ice hole. These will be inaccurate readings. Dispense water into the holding container (500-1000 mL) using the hand pump. Place tip of meter in container and record the reading on the field sheet.

Dissolved Oxygen: Open Water

Using a YSI 600 or 550A meter you can obtain dissolved oxygen readings. If you have access to one of these meters, place the meter in the water and allow the meter to acclimate for 3 to 5 min. Record the DO reading on the field sheet.

Under Ice

Dissolved Oxygen is not a critical parameter at under ice conditions. However, if you have the capability of measuring DO, please do so.

Water Sample Collection

Wear Latex or Nitrile disposable gloves during sampling. Avoid touching the boat or anything besides sampling equipment. If gloves have become compromised, dispose and put on a new pair.

From Boat:

Pick a location where river flow is not contaminated by upstream point source pollution (sewage effluent, docks, boat landings, bridges, etc). Position the boat as close to center of the river as possible pointing the bow upstream and holding the same position. Make collection samples off the bow or near the front of the boat.

From River Bank:

Pick a location where river flow is not affected by eddies (straight river reach) or contaminated upstream point source pollution (sewage effluent, docks, boat landings, bridges, etc). Wade out into current as far but as safely as possible. Always collect samples with sample bottles positioned upstream of you.

Under Ice Sampling:

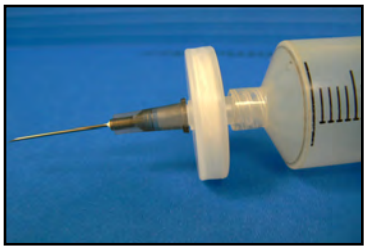
1. Find the centroid of flow (mid channel) where you can best estimate the most water is passing.
2. Drill a hole in the ice (at least 6 inches/15.24cm) using an auger. Manual augers are preferred but gas-powered augers are also acceptable.
3. Clear the hole of loose ice as best you can. Use the manual under ice bulb sampler to collect a sample.
4. Drop the long end of the line with the brass weight down the hole so that it is well below the bottom of the ice.
5. Squeeze the bulb with it in an upright position for about 2 minutes. This will flush the sampler and also flush air bubbles.

Filling the Bottles

Dissolved Gas: (four 30 ml clear glass serum bottles with blue caps)

Open Water Sampling:

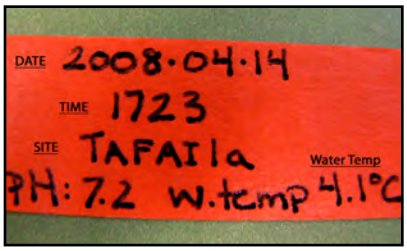
1. Rinse a 60 ml plastic syringe three times with water by sucking up about 30 ml of river water. Open the syringe to full capacity and shake for 5 seconds before discarding. This process must be repeated three times.
2. Carefully fill the syringe with bubble-free river water from 6-12 inches (15.24-30.45 cm) below the water surface. Tap the syringe while pushing slightly on the plunger to expel any bubbles.
3. Attach a 0.45 micron “GMF” filter to the syringe. Make sure the connection is tight.



4. Attach a needle to the filter, tightly. While pointing the syringe up, push on the plunger to expel air from the filter and needle, and to rinse the filter with a milliliter or so of water.

5. Applying a steady pressure to the syringe plunger, (holding the serum bottle upside down) insert the

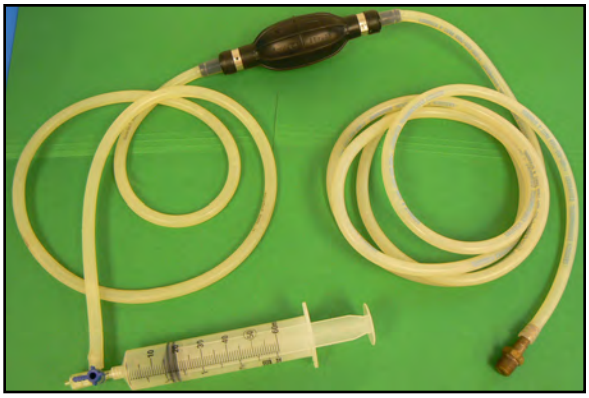
needle through the serum bottle top and inject 15 ml of water into the serum bottle (following the volumetric lines on the outside of the syringe). Maintain pressure on the syringe plunger when removing the needle from the serum bottle so gas does not move back into the syringe. Note: one needle must be used for both "acidified" serum bottles. A separate needle must be used for the "non-acidified" serum bottles!



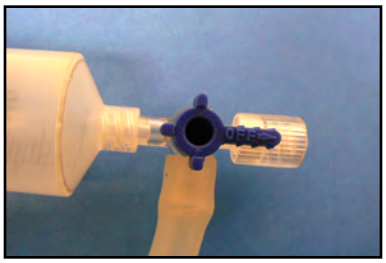
6. Record date, time, site name, pH and water temperature on each bottle. Follow label.
7. Remove the needle carefully, cap it and dispose of safely (sharps bottle)
8. Remove the used GMF filter from the syringe.
9. Record any observations or procedural mishaps in the "additional comments" section of the field sheet.

This work needs to be done quickly as the gasses will diffuse from the plastic. It is very difficult to do this work in sub-freezing temps. If the needles keep freezing, move operations inside if possible, again, working quickly and make a note on the field sheet.

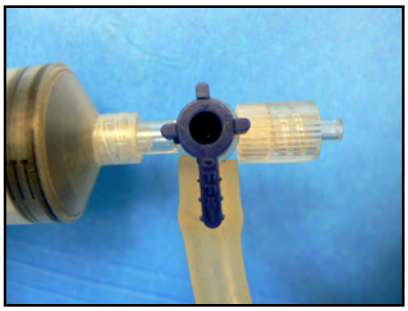
Under ice sampling:



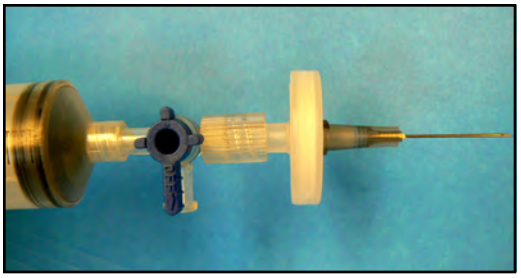
1. Have the syringe ready with plunger all the way in and the 3-way valve at the proper position to fill the syringe (there is an “off” indicator that will show the flow directions).



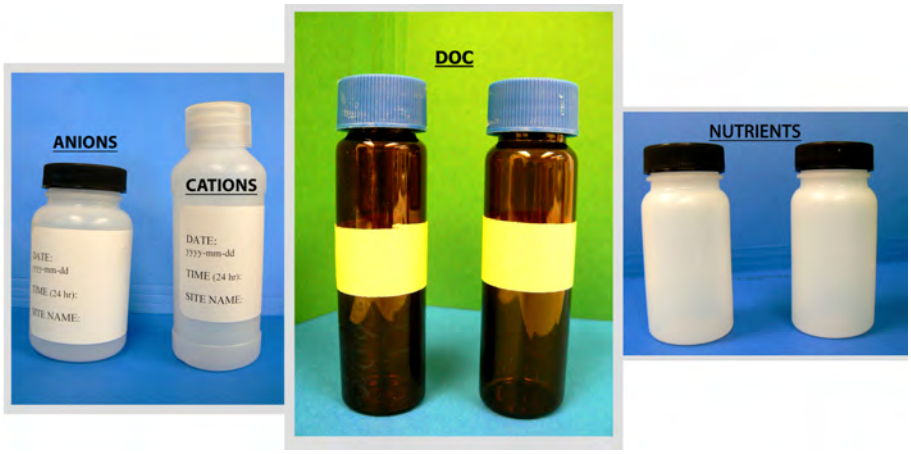
2. Squeeze the bulb and let the syringe fill to slightly past the 60 ml mark.
3. Divert water to flow out of the syringe using the 3-way valve.



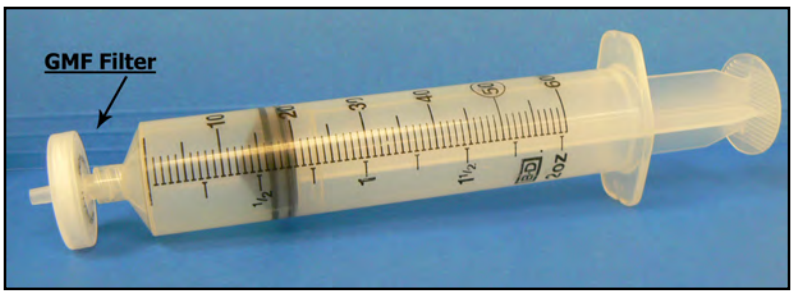
4. Disconnect the tubing from the syringe.
5. Invert the syringe and tap any air bubbles to the valve end and dispense all the air by gently plunging (don’t worry about tiny bubbles, you can never get all the air)
6. Follow procedure for open water sampling starting at step 3



Filtered Water: (DOC, Major Ions, Nutrients)



1. Remove the cap from the tip of the syringe and save. Rinse a 60 ml plastic syringe three times with river water. Fill the syringe with about 30mL river water, open the syringe to full capacity and shake for 5 seconds before discarding to the side. This process must be repeated three times! (Doing the 3-rinse process once at the beginning of sampling is sufficient).
2. Fill the syringe by drawing river water from at least 6-12" (15.24-30.45 cm) below the water surface.
3. Screw the GMF filter on to the syringe. Make sure the connection is tight. Re-use the filter for as many filtered samples as possible.



***When storing the syringe make sure the plunger is pressed in all the way to the end to keep the rubber from drying out!**

4. Filter river water into the vial. Apply a steady pressure to the syringe plunger filling the bottle to the “shoulder”.

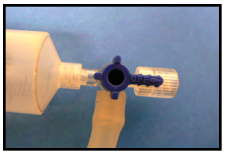
5. Cap vial TIGHTLY and record date, time, and site name on vial.

6. Record any observations or procedural mishaps in the comments section of the field sheet.

All plastic bottles and brown glass vials should be filled to the “shoulder”, as indicated in the picture above.

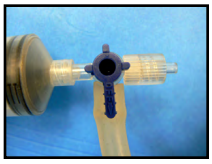
Under Ice Sampling: (DOC, Major Ions, Nutrients)

1. Rinse a 60 ml plastic syringe three times with river water. Fill the syringe with about 30mL river water, open the syringe to full capacity and shake for 5 seconds before discarding to the side. This process must be repeated three times.



2. Have the syringe ready with plunger all the way in and the 3-way valve at the proper position to fill the syringe (there is an “off” indicator that will show the flow directions).

3. Squeeze the bulb and let the syringe fill to slightly past the 60 ml mark.



4. Divert water to flow out of the syringe using the 3-way valve.

5. Disconnect the tubing from the syringe.

6. Follow the procedure for open water sampling starting at step 3.

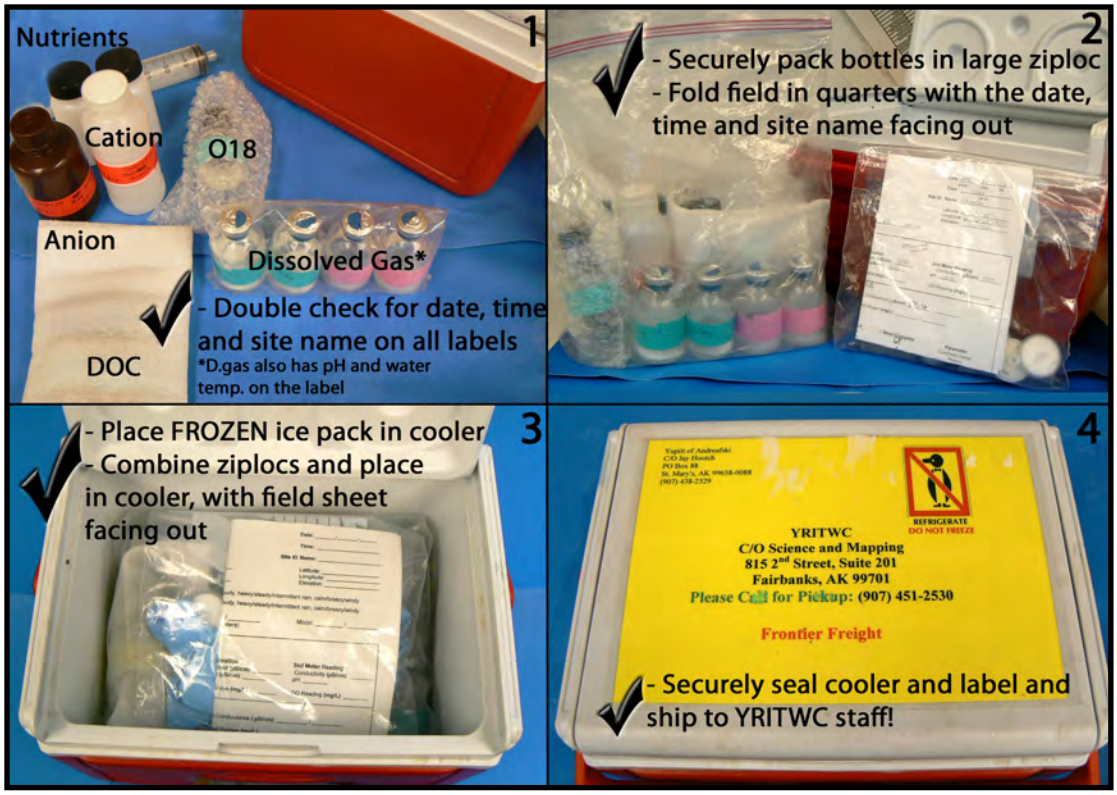
Unfiltered Water: (O18)

1. Fill the syringe by drawing river water from at least 6-12” (15.24-30.45 cm) below the water surface.
2. Empty the water into the bottle* and repeat step one if necessary.
3. Fill the bottle until a meniscus forms (round curve of water). Carefully screw on the cap. There can be NO AIR BUBBLES in this sample.
4. Label the bottle with the date, time, and site name.
5. Record any observations or procedural mishaps in the “additional comments” section of the field sheet.

* New kits will contain a smaller, 10ml glass vial to fill for the O18 sample. Same procedures apply with a smaller volume of water.

Shipment

Pack samples CAREFULLY, use foam sleeves for glass vials and place all bottles in the large Ziploc bag. Field sheets should be folded in quarters with the date, time, and site name facing out. Place the folded field sheet in the small Ziploc bag and place the small Ziploc bag inside the large Ziploc bag so the date, time, and site name is visible through the bags. Place a <u>frozen</u> ice pack in the cooler with the sample! Turn the shipping label over so it reads "TO: YRITWC Science Program". Tape the cooler shut and drop sample off for the flight out.



Contact the YRITWC staff and inform them that a shipment is being sent. YRITWC staff will need all relevant information regarding the shipment (courier, date/time of drop off, flight number and expected arrival time). Shipments are best sent using local airlines.

Contact names and Numbers:

Leah Mackey - FAIRBANKS
Office Phone: 907 451-2530
Cell: 907 388-3602

Email: lmackey@yritwc.org

Carol Thomas - ANCHORAGE
Office Phone: 907 258-3337

Email: cthomas@yritwc.org

Online Tools:
www.yritwc.org/science
* Field Manual
* Published Open File Reports
* USGS-YRITWC Fact Sheet
* Posters on the department & water quality data
* Link to water quality DATAbase

www.udel.edu/Geography/calm/
* Active Layer Network data

Example Field Sheet

Yukon River Inter-Tribal Watershed Council

Date: _____-_____-_____
yyyy- mm- dd

Time: _____
24 hr

Site ID **Name:** _____

Technician(s):_____

Waterbody Name: _____

Latitude: _____
Longitude: _____
Elevation: _____

Equipment (circle one) Hanah combo, YSI 63, YSI 63 & 550a

Calibration Data ----------> Air Temp **(°C)**: _____

pH Calibration	**Conductance Calibration**	**Dissolved Oxygen Calibration**
pH 7 Buffer Reading: _____	Conductivity Standard Used (µS/cm): _____	Barometric Pressure (mmHg): _____
Solution temp (°C): _____	Solution temp (°C): _____	DO Reading (%sat): _____
pH 10 Buffer Reading: _____	Conductivity Calibration Reading (µS/cm): _____	DO Reading (mg/L): _____
Solution temp (°C): _____	**Hanna Meter Calibration:** Conductivity (µS/cm): _____ pH: _____ Solution temp (°C) _____ Solution temp (°C) _____	

Field Measurements ----------> Air Temp **(°C)**:_____

Water Temperature **(°C)**: _____ Specific Conductance **(µS/cm)**: _____ (63: flashing C)

pH: _____ Dissolved Oxygen **(mg/L)**: _____

Sample Collection Data

Bottle Description	Quantity/Size	Filter?	√ When Complete	Parameter
Serum Bottles	4 / 30mL	Yes	☐	Dissolved Gases
Clear Plastic Bottle	1 / 125mL	Yes	☐	Anions
Clear Plastic Bottle	1 / 125mL	Yes	☐	Cations
Amber Glass Vials	2 / 40mL	Yes	☐	DOC
Clear Plastic Bottles	2 / 60mL	Yes	☐	Nutrients
Clear Glass Bottle	1 / 60mL	No (*NO AIR)	☐	Oxygen 18/Tridium

Weather Conditions Now (circle): overcast /clear /partly cloudy /cloudy, heavy/ steady/ intermittent rain, calm /breezy/ windy
Weather in Last 24 hours (circle): overcast/ clear/ partly cloudy/ cloudy, heavy/ steady/ intermittent rain, calm/ breezy/ windy

Sample Location Description (circle): mid-channel / streambank / other, riffle / pool / eddy
Flow Description (circle): isolated pools / trickle / < 5 gal per sec / > 5 gal per sec
Water Clarity (circle): clear / cloudy (> 4 " visibility) / murky (< 4" visibility) **< = less than**
Site Odor (circle): none / fresh algae / chlorine / rotten eggs / sewage / other **> = greater than**
Other (circle): litter / foam or suds / oily sheen / algae and/or water plants

Additional Comments

***Remember to take pictures of your sampling adventures!**

Buffer Solution Temperature

Charts

Chart 1

pH 7

Temp °C	Temp °F	pH
0	32	7.12
5	41	7.09
10	50	7.06
15	59	7.04
20	68	7.02
25	77	7.00
30	86	6.99
35	95	6.98
40	104	6.98
45	113	6.97
50	122	6.97
55	131	6.98
60	140	6.98
70	158	6.99
80	176	7.00
90	194	7.02

Chart 2

pH 10

Temp °C	Temp °F	pH
0	32	10.33
5	41	10.25
10	50	10.18
15	59	10.11
20	68	10.05
25	77	10.00
30	86	9.95
35	95	9.92
40	104	9.88
45	113	9.85
50	122	9.82
55	131	9.9
60	140	9.77
70	158	9.73
80	176	9.69
90	194	9.66

Chart 3

Specific Conductance 1413

Temp °C	Temp °F	µS
5	41	896
10	50	1020
15	59	1147
16	60.8	1173
17	62.6	1199
18	64.4	1225
19	66.2	1251
20	68	1276
21	69.8	1305
22	71.6	1332
23	73.4	1359
24	75.2	1386
25	77	1413
26	78.8	1440
27	80.6	1467
28	82.4	1494
29	84.2	1521
30	86	1548
31	87.8	1575

Table 1.

Site Name	Site Description
yuyxy1b	Yukon River Below Whitehorse
yuda1a	Yukon River Above Dawson City
yueaa1a	Yukon River above Eagle
yubri1a	Yukon River at Stevens Bridge
tafai3a	Tannana River Above Fairbanks
yufyu1a	Yukon River above Fort Yukon
pofyu1a	Porcupine River Above Fort Yukon
chfai6a	Chena River Above Fairbanks
cld661a	Clear Water Creek
tafai1b	Tannana River below Fairbanks
chfai1b	Chena River below Fairbanks
tanen1a	Tannana River Above Nenana
yurby1a	Yukon River above Ruby
yugal1a	Yukon River above Galena
kokyu1a	Koyukuk River above Koyukuk
koksl1a	Koyukok River Above Huslia below the Hog river
koksl2a	Koyukok River Above Huslia above the Hog River
yuanv1a	Yukon River above Anvik
ananv1a	Anvik River Above Anvik
yursh1a	Yukon River above Russian Mission
yupqs1a	Yukon River above Pilot Station
yuksm1a	Yukon River above St. Mary’s
anksm1a	Andreafski River Above St. Mary’s
yumll1a	Yukon River above Marshall
nivak1a	Ningliqvvak River Above Chevak
chvee1a	Chandaler River Above Venetie
bohpb1a	Bone Pond at Hooper Bay
akhpb1a	Akuliqutaq Slough at Hooper Bay
nahpb1a	Naparyaraq Slough at Hooper Bay
bihpb1a	Big Lake at Hooper Bay
clsmk1a	Clear Lake at St.Michael’s