

FIELD PROCEDURE: WATER CHEMISTRY

EQUIPMENT NEEDED:

Note: *Don't leave this equipment out in freezing temperatures unless you're using it. If air temperatures are just below freezing, keep the turbidity standards in your pocket. If the air temperature is below 23°F (-5°C), the YSI meters won't operate properly and your teammates probably won't either!*

- Tarp
- HF-DRT 15CE turbidimeter
- YSI-60 pH meter
- pH buffer test & top-up bottles
- foam holder for pH test bottles
- YSI-85 multimeter
- DO calibration chamber
- pocket barometer with instructions
- Hach water quality test strips for nitrate/nitrite (in pill bottle)
- watch with second hand or stopwatch
- sample collection bottle with screw top
- squirt bottle of purified water
- small spray bottle of glass-cleaning solution
- box of lint-free tissues
- ziplock bag
- 6 extra AA alkaline batteries for YSI-60 and 85 meters
- approximate altitudes of your reaches
- data sheet, clipboard, pencil
- One game die
- [plastic tub with tight-fitting lid]

PROCEDURE:

One person can perform these tests.

Where to sample: In this procedure, sampling consists of filling one sample bottle that will be used for two tests, and then dipping two probes in the stream. Pick an area where the stream is flowing and appears to be well mixed. **Do not sample downstream of where your team has disturbed the bottom.**

Note on clean rinse water: Whether it's called "Purified Water" or "Distilled Water" or

"Deionized Water," for our purposes it's the same stuff!

- Field Replicates:** Our quality control plan requires that at one of your team's sites (or ≥ 10% of your sites if you have >10 sites), you take a second set of readings for all chemical tests except the nitrate test strips. Such field replicates give an indication of how much variability there is in the equipment, sampling techniques, and environment. To do this:
1. Assign a number to each of your team's sites **that you're sure you'll get to**.
 2. Roll the die in your field kit "Treasure Box" until one of those numbers comes up.
 3. At that reach, perform each chemical test a second time, as soon as possible after the first, redipping the sample bottle for the turbidity test. You do NOT need to recalibrate between tests.
 4. Record/initial results on the replicate section of the data sheet.

REPLICATE DEVIATION & QA

Our Quality Assurance plan requires us to take replicates in order to check the precision of our data. If your replicate for a given parameter differs widely enough from the original sample, we have to label ALL the data for that parameter for your team for that season as "Estimated" or "Rejected". Here are the allowed differences between sample and replicate:

<i>Parameter</i>	<i>Acceptable difference</i>
Turbidity	±1 NTU, or Sum ≥ Difference x 30
Water temperature	± 0.2°C
DO concentration	± 0.3 mg/L
Conductivity	Sum ≥ Difference x 30
pH	± 0.2 pH units

If any of your sample/rep differences are beyond the acceptable limits, take further replicates until you have a pair of readings within the limits. Then label the first of the pair your "sample" and the second your "replicate."

INITIAL INSTRUMENT PREPARATION:**1. YSI-60 pH Meter:**

- a) If you haven't already calibrated the meter for the day, do that now (see "pH Meter Calibration" protocol). If you have calibrated already, indicate "Yes" at the top of the data sheet and give the site name of the form on which you recorded the calibration information (this will generally be the first site of the day).
- b) If the probe is inside a bottle rather than inside the meter's chamber, see the "Removing the Buffer Bottle" section at the end of this chapter.
- c) Turn on the meter. All segments of the display will be activated for a few seconds. Eventually, pH and temperature will be displayed. If "LO BAT" is displayed, you will need to replace the batteries. If pH and temperature are not displayed, press "MODE" until you get to the right display on the screen.
- d) Take the probe out of its chamber. (If it won't come straight out, turn it slightly clockwise as you pull.) Check and tighten all connections along the cable, probe, and guard-piece at the end of the probe. Find a safe place in the stream to place it for a warm-up. Put it:
 - downstream of where you will eventually sample (see sampling procedure later in this section);
 - in a place where the water isn't too turbulent;
 - where the bottom isn't silty or muddy (between a couple of rocks would work); and
 - where you can safely place the main part of the meter up on the bank.

2. HF Scientific turbidimeter:

- a) The meter is water-resistant but not waterproof. If it's raining, close the cover or cover the unit with your body.
- b) Turn the meter on to the lowest range to begin its 15-minute *warm-up*. If the

screen reads "BAT," you must recharge the instrument or plug it into an outlet to use it; see "If Turbidimeter battery is too low" instructions at the end of this protocol.

3. YSI-85 multimeter:

- a) Turn on the meter. The instrument will activate all segments of the display for a few seconds, then go through a self-test procedure that will last a few more seconds. A number will be displayed, along with the letters "CEL." That number should be between 4.8-5.2. If not, report the number on the data sheet and to the office staff.
- b) If the unit displays "Err" at this point, and "Err" does not disappear after a few seconds, try turning the unit off and back on again. If it displays "LO BAT," replace the batteries and discard the old ones. If it displays other error messages, you will not be able to use the instrument—record the problem and let the staff know about it as soon as possible. If it displays number readings, "rcl," or "ErAS," the meter is functioning properly.
- c) Take out the separate DO calibration chamber from your field kit. Check that the chamber is clean and the sponge inside is moist—if not, pour in water as needed and pour off the excess. (If the sponge is missing, just wet a small piece of rag and flatten it at the bottom of the chamber.)
- d) Remove the probe from the chamber on the side of the meter. Check and tighten all connections along the cable, probe, and guard-piece at the end of the probe. If the sponge inside the chamber looks dry, add a few drops of purified water, let it soak in, and then pour off the excess (necessary for proper dissolved oxygen calibration). Examine the probe. All holes should be clean of debris, and the gold cathode on the end should be shiny. The plastic membrane over the

cathode should not be loose, wrinkled, or damaged, and there should be no bubbles under it. Rinse if dirty. Note any unsolvable problems on your data sheet and continue if possible with the procedure.

e) If the membrane is wet or foggy, dab it dry with a rolled-up lint-free tissue. Then place the probe in the separate DO calibration chamber unit, inserting it all the way. Slide down the stopper on the cable to seal the probe and cable in the chamber. Place the chamber in the stream in such a way that the entire probe is beneath the water, but the tops of both the chamber and breather tubes are above the water—use rocks, stakes, etc. as needed to secure both tubes.

f) Erase prior readings from the meter:

- Press the MODE button as many times as needed for “ErAS” to appear on the screen.
- Press the DOWN ARROW and ENTER buttons simultaneously for approximately 5 seconds.
- When “DONE” flashes on the screen for 1-2 seconds, the data have been erased, and the meter will automatically return to normal operation.

g) Set the meter in a safe place for 15 minutes to let the unit warm up and the probe stabilize to stream temperature.

4. ***Air-temperature thermometer:*** You’ll want to hang the thermometer in a shady spot on the bank with good air circulation, preferably at about eye height, until its temperature stabilizes at the air temperature. We suggest you read the thermometer after taking the turbidimeter readings, but before taking the YSI-meter readings, so that you don’t forget it!

COLLECTING A WATER SAMPLE FOR NITRATE AND TURBIDITY TESTS:

Follow the sample-collection instructions in the “Grab Samples” field procedure, except:

- Choose a sampling location downstream of where you will insert the YSI probes (see descriptions later in this section).
- Before collecting the sample, you need to open the reusable plastic screw-top sample-collection bottle and rinse it and the lid three times in the stream, facing upstream, at a place where your team has not disturbed the bottom—preferably at mid-stream and mid-depth. Empty the bottle downstream of where you are going to take your sample, so as not to stir up the bottom.

NITRATE-NITROGEN SCREENING WITH HACH TEST STRIPS:

1. The “use-by date” is marked on the bottom of the bottle. Record the month and year on your data sheet.
2. Shake the sample bottle thoroughly, then take one strip from the nitrate test-strip bottle and replace the cap.
3. Remove the sample bottle cap and dip the test strip in the sample for ***one second*** and then remove. Do not shake the strip.
4. Hold the strip level, with pads facing up, for ***60 seconds***. Meanwhile, recap the sample bottle.
5. Compare the NITRATE test pad (the one on the end of the strip) with the upper color chart on the pill bottle. Look for the color-block most resembling the end pad. **DO NOT INTERPOLATE BETWEEN COLOR-BLOCKS.** The colors can be hard to interpret; what you’re looking for is the degree of pink. A brownish color with no pink would be a zero. If in doubt, have others look, or try again.
6. Discard the test strip in the paper-refuse container—no replicates needed.
7. Record the number of the closest color-block (units are mg/l of nitrate-nitrogen) and sampler’s initials (see following box).

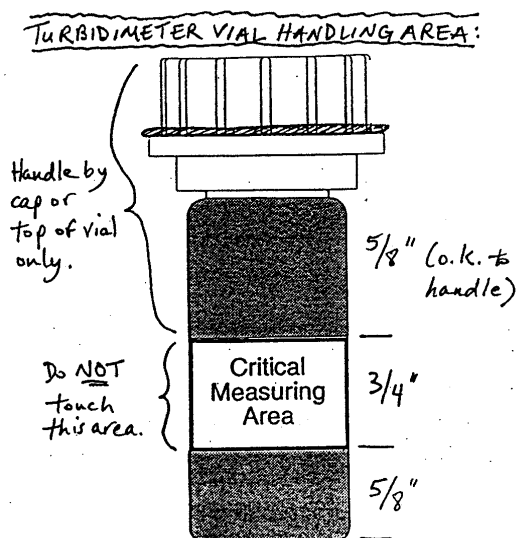
SAMPLER'S INITIALS

For each test that you perform in this protocol, there is a "Sampler's Initials" box to the right of the data boxes. Be sure to put all the initials of one sampler taking responsibility for the data; this should be someone who has been properly trained (see "Quality Assurance" protocol).

TURBIDITY MEASUREMENT (HF SCIENTIFIC DRT-15C OR 15CE METERS):

Handling the vials: Inside the meter will be one sample vial and two reference vials—one marked on the cap with a number near zero, and the other at some higher number of NTU (a measure of turbidity).

1. **Do not ever open the reference vials or unscrew their caps.**
2. **Take care not to scratch or get dirt on any of the vials.** Do not put them down anywhere except inside the meter case.
3. When moving closed vials, **hold by the caps only.** When opening, closing, or sampling, **hold the glass portion of the vials in the area just below the neck,** which is outside of their critical measuring area (see diagram below). When possible, hold the vial with a lint-free tissue.

**Taking the readings (with meter still on after the warm-up period):**

- 1) **Record last calibration date:** The latest full-range calibration date should be marked

on a sticker on the face of the meter. Record it on your data sheet.

- 2) **Zero the meter:** Take the ~zero NTU reference vial out of the trough, holding by the cap or upper part only. Clean the critical measuring area with cleaning solution and a lint-free tissue. Place this vial in the meter-well, aligning the arrow on the cap with the plastic pin in the well collar. (The meter should still be turned to the lowest range.) Then adjust the REFERENCE ADJUST until the display reads the same as whatever the vial cap is marked as.
- 3) **Check calibration:** Take the higher-number sealed reference vial out of the trough, holding by the cap or upper part only. In the space marked "Field Calibration Check," record the # of NTUs listed on the vial and its expiration date. Clean the critical measuring area with cleaning solution and a lint-free tissue. Place this vial in the meter-well, aligning the arrow on the cap with the white plastic pin in the well collar. The meter should be set to its lowest range. Record the reading on the meter to the nearest 0.01 NTU.
- 4) **Calibration check problems:** If the above reading differs from what's written on the vial by more than 10%, try to improve the reading by cleaning the vial again, warming it if it keeps fogging up, or drying the meter-well if it's wet. If reading is still more than 10% off, continue with the following steps—the data you collect may still be useable.
- 5) **Fill the sample vial (remember to hold by the upper part only):**
 - a) Thoroughly agitate the sample in the collection bottle—but avoid introducing bubbles by shaking. Immediately fill the sample vial 1/4-1/3 full and shake with the cap on loosely. Empty the sample vial. Repeat this rinse. Then agitate the collection bottle and fill the vial to just below the bottom of the threads. Retighten the vial's cap.

- b) Holding the sample vial **by the cap**, spray cleaning solution on the outside of the glass and wipe it dry with a lint-free tissue.

6) **Take the readings:**

- a) Gently invert the vial several times to mix—be careful not to create bubbles.
- b) Quickly insert the sample vial in the meter well, aligning the arrow on the vial's cap with the white pin on the well's collar ring. The readings will change rapidly, then probably slow down after a few seconds. Watch the meter for 30 seconds, then record the **whole** number (or zero) to which the readings tend most closely during those 30 seconds. (For example, you would record "1" if most readings fall between 0.5 and 1.5.)
- c) If the meter displays " Δ ~ 1 .", with a space between the 1 and the decimal point, move to the next higher range. If the meter shows a similar display at its highest range, record ">200" for the model 15C or ">1000" for the 15CE.
- d) Repeat steps 5 & 6 twice more, for a total of three readings. If readings vary greatly, take more readings until you have three that are close (one unit or 10%, whichever is greater). Record these three readings and the sampler's initials.
- e) If you are collecting replicates at this site, gather another sample in the sample bottle and repeat this procedure, then see the first page of this protocol to see if you have an acceptable replicate.
- f) If the battery goes dead while you're sampling, see the "If the battery is too low" procedure at the end of this protocol.

7) **Clean and store:**

- a) Turn off the meter until you get to your next reach.
- b) Holding the sample vial by the portion just below the neck, rinse it as follows:

- i) Pour out the sample water.
- ii) Fill 1/4-1/3 full with purified water.
- iii) Screw the cap on loosely.
- iv) Shake upside down.
- v) Empty the vial, twisting so that water rinses the sides.
- vi) Repeat this rinsing one more time.
- vii) Empty the vial and recap it.
- c) Place the .02 reference vial in the measuring well, and put the empty sample vial in the trough on the right side of the meter, along with the higher-number reference vial.
- d) Close the meter.
- e) Empty the plastic sample collection bottle, recap and store.

AIR-TEMPERATURE MEASUREMENT:

First make sure the sun hasn't been shining on the thermometer. Estimate the reading to the nearest °C. Wait 30 seconds and estimate again. If the reading hasn't changed, record it and sampler's initials on your data sheet. If the reading has changed, jot down the second reading, leave the thermometers hanging, and read it again after finishing the YSI readings. Record the average of the two readings on your data sheet.

GO TO THE NEXT PAGE...

DISSOLVED OXYGEN, TEMPERATURE, AND CONDUCTIVITY MEASUREMENTS (YSI-85 METER):

NOTE: The YSI-85's buttons are slow to respond, so wait a few seconds after pressing any button to give the meter time to react. Otherwise, you may skip over the screen you want.

1. ***Calibrate the meter:***

- a) After the meter has been stabilizing in the stream inside the calibration chamber for 15 minutes, get to a screen that shows a figure in % near the top (the DO % Saturation) and a figure in °C below it (the temperature). (Press the MODE button repeatedly if you need to change screens, leaving a second or two after each pressing).
- b) Wait for stabilization, defined as follows: **During a period of 30 seconds, both DO Sat % and temperature stay within ± 0.1 of their initial readings.** If they do not, start over again and wait another 30 seconds, etc.

TROUBLESHOOTING THE DO METER: If the meters don't stabilize within 10 minutes of observation, try these steps in the following order:

- Take the probe out of the chamber, pour any excess water out of it, and check the membrane for condensation. Pat dry again if necessary.
- Turn the meter off and then on again.
- Turn off the meter, take out the batteries, wipe them and the inside of the battery cover-plate with a cloth, and re-insert them in a different order (but according to the diagram on the inside of the tubes).
- Try the above step again. Yep, again!
- Replace the batteries with the fresh batteries in the "Treasure Box" of your kit's Clean Bag.

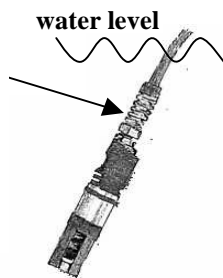
If problems persist, note on your data sheet the variation in readings within your last 30-second observation period, and proceed.

- c) When stabilization criteria have been achieved, press both UP and DOWN ARROW buttons at the same time. The next screen will prompt you to enter the altitude to the nearest hundreds of feet, using the UP or DOWN buttons to

change the number. For instance, 2 would mean 200' elevation. (If you don't know your exact altitude, take your best guess and record your guess on the data sheet.) Set the proper elevation, then press ENTER once.

- d) The meter will now show CAL in the lower left of the display. Make sure the % reading stays within a range of ±0.1% for 30 seconds, then press ENTER once. The display should read "SAVE," and the instrument is now calibrated for DO. The reading should now be near 100%.
2. ***Take the probe out of the calibration chamber*** and check for condensation on the membrane; if there are observable drops, dry and recalibrate.
 3. ***Record the number or name written on the meter*** (e.g., "1" or "OPI"). And if you are not submitting the data to Clallam County, record the latest calibration dates for DO ("Winkler"), conductivity, and temperature, which should be written on stickers on the back of the meter.
 4. ***Record the barometric pressure***, following the instructions on the pocket barometer.
 5. ***Record the time*** on your data sheet, to the nearest minute, and ***sampler's initials***.
 6. ***Insert the probe in the stream:*** Have the screen on the meter set to DO % Saturation. Standing downstream or to the side of the probe, hold it in the current, facing the probe upstream, in a place with steady flow, adequate depth, good mixing, and no surface turbulence. If the current is < 1 ft/sec, hold the probe halfway down in the water column and stir back and forth so that water moves over it at the rate of at least 1 ft/sec; but do not create bubbles. Keep the entire probe below water level—see following diagram.

Water level should be at least up to the cable connection—but be careful not to kink the wire at this stress point!



7. **Stabilize and save the readings:** Wait for stabilization according to the following criteria: **For 30 seconds:**

- **DO Sat stays within $\pm 0.5\%$.**
- **Temp stays within $\pm 0.1^\circ\text{C}$.**

Then press ENTER and hold for 2 seconds. The meter will flash SAVE on the display along with a site number, indicating that it has saved the readings for all parameters.

8. **Post-check of calibration:** Shake off the probe, pat it dry, and put it back in the calibration chamber in the stream. Let the readings stabilize again according to these criteria: **During a period of 30 seconds, both DO Sat % and temperature stay within ± 0.1 of their initial readings.** If the DO Sat reading is between 97-103%, record it on your data sheet and go to the next step. If not, recalibrate the meter and re-take the readings.
9. **Record the readings:** Press MODE repeatedly until "rcl" (recall) is displayed on the screen. The number below "rcl" should be the same site number the meter gave when it saved your data. (If not, use the "Up" arrow to find that site number, or retake your readings!) Then press ENTER successively to record the following readings, in the following order, using our rounding convention as necessary (see Quality Assurance protocol):
- Temperature:** to nearest 0.1°C .
 - DO % Saturation:** to nearest 1%.
 - DO Concentration:** to nearest 0.1 mg/L.
 - Conductivity:** You will see a screen with a figure in " μS " or " mS " and the " $^\circ\text{C}$ " symbol **not flashing**. Record to the

nearest whole number of μS (microSiemens). (If you go too far, work your way around again.) If the reading is in mS (milliSiemens), multiply by 1000 (i.e., move the decimal place 3 places to the right) to convert to μS , and record to the nearest whole number.

- e) **Salinity:** Skip over the next screen, which shows a conductivity reading with the " $^\circ\text{C}$ " symbol flashing (temperature-compensated conductivity, which we don't record). Then read and record the next screen, which shows a "ppt"

COMMON SENSE AND EXPECTED RANGES

Please compare your readings with the expected ranges on the datasheet. If you're outside the expected range, consider re-sampling or troubleshooting with your fellow samplers.

Conductivity readings in particular have a nasty habit of being wacky. Stream conductivity is rarely lower than $25 \mu\text{S}$. If your readings are lower than this, you'll need to troubleshoot:

- If the reading is 0.0 or 0.1, you might be reading the salinity ("ppt") screen rather than the proper conductivity screen; if so, scroll through the screens again (by pressing ENTER) until you get to the right one.
- You might not have held the probe completely underwater. Try taking another set of readings.
- The readings might be in mS rather than μS (see above).

symbol, to the nearest tenth. This is the salinity in parts per thousand.

10. **Record the sampler's initials.**
11. **Erase the data from the meter** once you have entered it on your data sheet:
- Press the MODE button as many times as needed for "ErAS" to appear on the screen.
 - Press the DOWN ARROW and ENTER buttons simultaneously for approximately 5 seconds.

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- c) When "DONE" flashes on the screen for 1-2 seconds, the data has been erased, and the meter will automatically return to normal operation.

12. If you are collecting *replicates* at this site, gather another set of readings with the YSI-85; recalibration not needed unless the post-check fails., but , then see the first page of this protocol to see if your pairs of readings for water temperature, dissolved oxygen concentration, and conductivity are within the acceptable precision limits, and resample as needed.

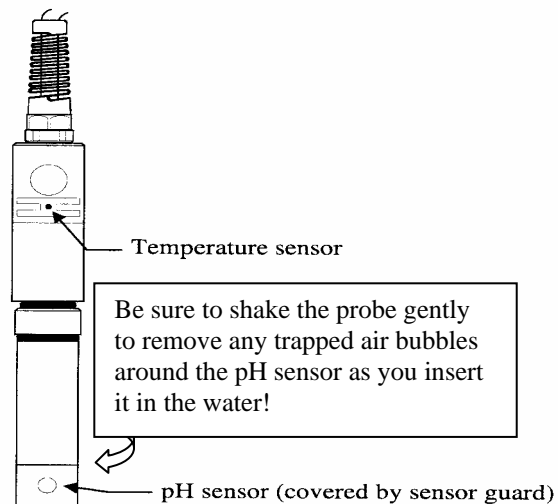
13. **Turn off the meter** and give a cheer!

ELECTRONIC PROBLEMS?

If the YSI meters stop showing all the decimals, show wacky readings, or don't respond when you press buttons, try the battery tricks described above. They'll probably work! If not, note what happened on your data sheet and notify program staff.

pH MEASUREMENT (YSI-60 METER):

1. After the YSI-60 pH meter has warmed up in the water, get a screen that shows pH and temperature. You may need to press "MODE" repeatedly until this screen appears.
2. Place the probe in the water at the spot where you wish to sample, shaking gently to remove any bubbles trapped around the pH sensor. Make sure the pH sensor at the end of the probe and the temperature sensor near the top of the probe are both immersed in a well-mixed part of the stream where the bottom has not been disturbed. You can either:



- Dangle the probe at mid-depth in a well-moving but non-bubbly part of the stream; or
 - Find a well-mixed pool and swing the probe back and forth at mid-depth; or
 - In shallow water, wedge the probe between rocks in the middle of a riffle or the tailout of a pool, where the water is moving well.
3. Read the meter to the nearest hundredth of a pH unit. (But do not record it yet.)
 4. Wait 2 minutes and read the meter again.
 - a) If the reading has not changed by more than 0.01 pH unit, record that reading to the nearest tenth (not hundredth) on your data sheet. (NOTE: Keep in mind Streamkeepers' special rounding convention—see "Quality Assurance.")
 - b) If the reading has changed by more than 0.01 unit, wait another two minutes and try again. Repeat as needed until you've met the above criterion.
 5. If you have to wait more than 10 min. to get a stable reading, note that problem on the field sheet and notify program managers.
 6. If you are collecting replicates at this site, follow this procedure to take another pH sample, then see the first page of this protocol to see if you have an acceptable replicate.
 7. Shake off the probe, rinse with purified water, and pat it dry with lint-free tissues.

8. Meter calibration check:

NOTE: It would be adequate to just perform this post-test at the end of each day; however, if the meter fails that test, all data from that day would be invalid. The only way to assure acceptable data is to perform the post-test at each site, and then re-calibrate if the meter fails that test.

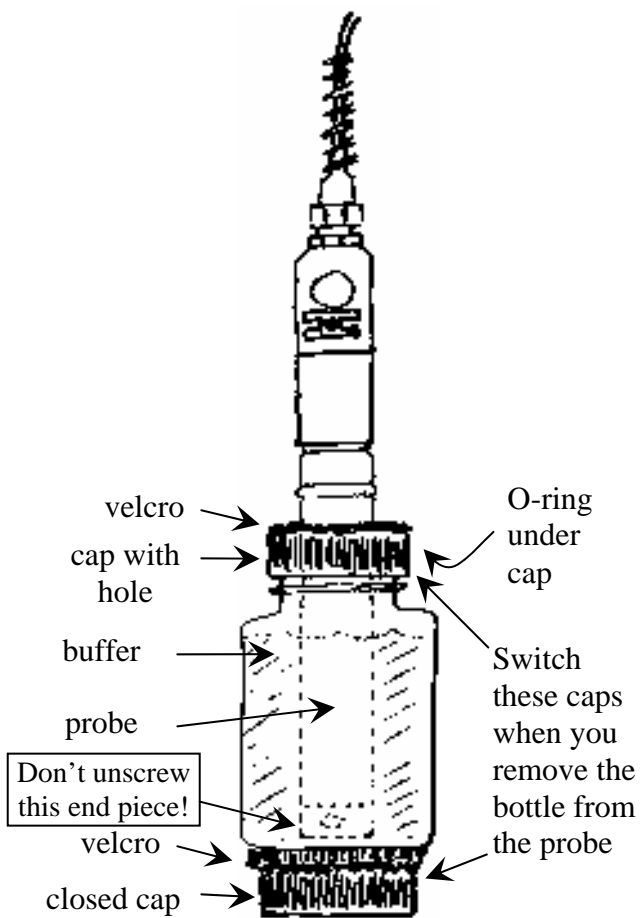
- a) Immerse the dried probe all the way into the pH 7 buffer test bottle, using the foam bottle holder to stabilize it. The temperature sensor (see diagram) must be immersed in the buffer—top up as needed from the extra pH 7 bottle. If it's raining, cover the buffer bottles with your body. Also, if possible, have a second person assist you by holding caps and screwing them right back on when finished with them. Keep the lids of these bottles screwed on tight when not in use.
 - b) Wait for the pH reading to stabilize (not varying by more than 0.01 for 2 min.).
 - c) On your data sheet, record the "pH 7 post-check" pH (to hundredths) and temperature (to tenths).
 - d) Record the expected buffer value from the temperature-corrected chart at the end of the "pH Meter Calibration" protocol (just prior to this one) or from your data sheet. Extrapolate as appropriate from the values in that chart.
 - e) Record the difference between the actual and expected readings; if this is ≤ 0.10 pH units, you can check "OK" and you're done. If not, you'll have to try recalibrating, using the "pH Meter Calibration" protocol, and then re-doing the readings; otherwise, the pH data you just took (as well as measurements at all subsequent sites) will be labeled "Estimated" or "Rejected".
9. Record sampler's initials.
10. Rinse with purified water, reinsert into the chamber, and turn off the meter.

IF THE TURBIDIMETER BATTERY IS TOO LOW TO USE IN THE FIELD: You can collect a sample (at least pint-sized) in a clean jar using the sample-collection procedure described above. Label the jar with the site and time of collection. Do the same with samples at your other sites that day (get jars to hold the samples; if possible, keep samples on ice and in the dark). Then at the end of the day, bring samples and meter home, plug in the meter, and take readings as you would in the field, while the meter is charging (see charging directions below). You can hold the sample 5 hours at ambient temperature and another 24 hours in the refrigerator, or 48 hours if kept constantly in the dark and at 4°C. Let the sample return to room temperature before testing. On the data sheet, record collection and reading times, and holding temperature and light-exposure. Then continue to charge the meter so you or some other team won't have trouble the next time!

TURBIDIMETER BATTERY CHARGERS are in marked ziplock bags in the field kit "clean bags"; the charger port is the front hole on the left side of the vials-trough (take out the vials and foam to see it). The unit does not need to be fully discharged before charging. Turn the meter on, then plug in the charger; you should see a "~" in the upper-left of the window. Then you can turn the meter off and let it charge. A full charge takes up to 12 hours but it's okay to partially recharge it. The fully charged meter will operate for up to 20 hours.

ALTERNATIVE WATER-CHEMISTRY PROCEDURES FOR POOR CONDITIONS: If the weather is severe and you wish to minimize your time on the creek, you may turn on and calibrate the turbidimeter and YSI-85 at home, and just keep them on throughout your monitoring day. Or you may take your samples to the car: first take a quick temperature reading in the stream with the YSI-85 (no calibration necessary). Then fill both the regular sampling bottle and the plastic tub, preferably at mid-stream and halfway-depth, filling completely and closing the lids under water. Get to the car a.s.a.p. In the tub, perform the DO/temp/cond test (remember to move the probe at 1 ft/sec), followed by the pH test. Then use the sample bottle for the nitrate and turbidity tests (taking a second bottle for replicates as needed). In addition to the usual data, note the alternate sampling procedure, actual stream temperature, and both the sample collection and sample reading times on your data sheet.

Removing the buffer bottle from the pH probe (YSI-60):



We store the pH probe in pH4 buffer solution to keep it in good shape if it's not going to be used for a while. Sometimes we may forget to take this bottle off before we send out the kit. If this happens:

1. Remove the "closed cap" from the Velcro at the bottom of the bottle.
2. Holding the bottle upright, unscrew it from the cap with the hole ("open cap") and screw the closed cap onto it.
3. Rinse the probe and open cap with purified water.
4. Slide the open cap toward the cord to expose the O-ring beneath the cap. Roll off the O-ring, then slide the open cap off the end of the probe.
5. Sandwich the O-ring between the Velcro on the bottom and the Velcro on the open cap, so that it doesn't fall out. Thus, the bottle,

- both caps, and O-ring are all stored together in a single "package" (see drawing below).
6. Remove the tape that's covering the probe chamber on the side of the meter, being careful not to lose the little sponge that's inside.
7. Add a few drops of purified water to the little sponge inside the chamber.
8. If possible, soak the probe in creek water for 30 minutes before taking your first reading.
9. Store the buffer-bottle "package" in the treasure box and let program staff know that it's in there.

