

Appendix B. Sampling Order & Equipment Instruction Sheets

Sampling order

- 1) If possible, before going out in the field you should complete your accuracy checks on the conductivity and turbidity meters. (See instructions for each on the respective equipment instruction sheets.)
- 2) Measure air temperature: (When measuring air temperature it is best to do this before you submerge your probe in sample water. We don't have any specific air sampling protocols but air temps should be measured so the probe is not receiving direct sunlight. Air temperature stabilization is slow relative to water temperature readings).
- 3) Collect sample in bucket from bridge or directly from stream if too shallow for bucket. To use the bucket lower it near the center of the channel (where the water is well mixed) to about 3' below the surface of the water. If stream depth is less than 6' (estimate) then lower bucket about ½ way between the surface and bottom of stream. **Make sure you rinse the bucket with stream water before filling the bucket.** If stream depth is too shallow to use the bucket, then measure conductivity and temperature directly in the stream and fill the glass DO bottle, turbidity vial, and nutrient, TSS, *E.coli* bottles from the stream. **Also, be sure and rinse the DO and turbidity bottles with stream water before filling.** If you wade into the stream to collect the samples, be sure to hold the containers upstream of you so the bottom sediment that you stir up doesn't get into the sample.
- 4) Pour water into grab sample bottles for TSS, *E. coli*, and nutrients being careful to not contaminate the rim of the bucket with your hands. After the grab samples have been taken and if there is still enough water in the bucket, rinse, submerge and fill glass DO bottle from blue bucket (or stream). (**Important:** don't pour water into bottle because this will aerate the sample and give an artificially high DO reading.)
- 5) After water has been collected for grab samples, and DO, fill the bucket a second (or third) time and immediately measure **water temperature** (with conductivity meter) and **conductivity**. Measure directly in the stream if flow is too low for bucket use.
- 6) Start DO measurement process.
- 7) Measure air temperature.
- 8) Measure turbidity.

Note: The most important thing is that water temperature and DO are measured immediately after collecting the stream sample because these parameters change rather quickly once the water is taken out of the stream.

Instructions for duplicate sampling:

- On the **Monitoring Dates** sheet, your name will be listed next to the date you should do a duplicate. You only need to do a duplicate at one site.
The monitoring sample and duplicate sample will be taken simultaneously using a separate bucket for each sample.
- For dissolved oxygen fill both bottles at the same time, either from the same bucketful of water or from the stream. Add the first two powders to one of the bottles and shake as directed. Then add the first two powders to the other bottle and shake as directed. Continue the process, doing each progressive step on one bottle, then the other.
- Also fill two vials for the turbidity duplicate sample at the same time and measure one right after the other.
- For conductivity and temperature, measure once (from the bucket or stream) and record results, then measure again and record results.
- Are your duplicate results: $\leq .3$ mg/L for dissolved oxygen, $\leq 10\%$ for conductivity, $\leq 5\%$ for turbidity? This is what each of these parameters needs to be to get an "A" grade. If your duplicate result for any of the parameters does not meet the above standard, try again.

Equipment List For Field Monitoring

- Dissolved oxygen kit (contains powder pillows, glass DO bottle with stopper, graduated cylinder for measuring out sample, scissors, titrator, sodium thiosulfide cartridge, delivery tubes, starch, and 500 ml Erlenmeyer flask)
- Rubber gloves
- Liquid waste container
- Distilled water
- Safety vest
- Turbidimeter (contains meter, sample vials, standards, oil, black cloth, drying cloth, logbook)
- Conductivity meter and logbook
- Conductivity standard
- Hand sanitizer
- Data sheets (in plastic folder in box)
- 2 packs of AA batteries
- Measuring tape
- Blue sampling bucket
- Extra D.O. bottle for duplicates
- 1 extra liter of distilled water
- Thermometer
- Funnel
- Safety goggles
- Ziploc bags
- Black markers or grease pens

Equipment List for Macroinvertebrate Sampling

- Long sleeve rubber gloves
- 5 gal Bucket
- Sample labels
- 1 ltr. Wide-mouth plastic sample jars
- Bug brush
- 500 micron D frame kicknet
- Clipboard
- Ethanol
- Tweezers
- Pencils

Collection of Grab Samples

Total Phosphorous

1. Fill a clean, unused 150 ml polyethylene bottle from Delta Environmental Lab, with the water body to be sampled, leaving room only in the neck of the bottle.
2. Label and place in the bag with other samples, and then in a cooler with ice to keep the sample preserved

TSS and Nitrate

1. Fill the reuseable, sterilized 500 ml bottle from Junction City Lab all the way to the top
2. Place in plastic bag with site, date and time marked on the bag only. Do not label the bottle.

E. coli

1. Remove cap carefully from the bottle and place face up on a clean surface.
2. Carefully fill the bottle to the indicator line, being careful not to let it overflow into the stream
3. Cap the bottle being careful to not let your hands, dripping water, or any other potential source of contamination, touch any portion of the rim or cap.

Dissolved Oxygen- Winkler titration

1. Thoroughly rinse glass DO bottle with stream sample water. Then fill the DO bottle by either placing it in the collection bucket or submerging into the stream by hand (when stream depth is too shallow for bucket). Fill the bottle until it overflows and make sure that no air bubbles are trapped in the bottle. Insert stopper. Don't let the bottle sit around! Do the next steps right away or the DO may change.
2. It is recommended that you put gloves on at this point. **Also, avoid getting reagents on your skin or clothing.**
3. Add powder 1 (manganous sulfate) & then powder 2 (alkaline azide)
4. Shake bottle vigorously for 30 seconds.
5. Wait until the particulates settle ½ way down bottle
6. **Again**, shake bottle vigorously for 30 seconds. Make sure there are no large, undissolved chunks of reagent left.
7. Wait until the particulates settle ½ way down bottle.
8. Add powder 3 (sulfamic acid). Be sure to avoid getting this on your clothes.
9. Shake until sample is clear amber.
10. Rinse both the graduated cylinder and flask first with distilled water and then with a little of the amber sample before measuring and pouring into flask.
11. Measure out 200 ml of sample in graduated cylinder and pour it into the 250 or 500 ml flask (whichever is in your kit).
12. Load black titrator with sodium thiosulfide cartridge by sliding it all the way into the slot and twisting 90°. Lower the plunger (push button in and down) on the titrator until it contacts the cartridge.
13. Take cap off cartridge, rinse a delivery tube with distilled water and insert into cartridge.
14. Turn the black dial on top of the titrator clockwise and allow a little of the sodium thiosulfide to come out. Just enough to remove air bubbles from the line.
15. Zero titrator by turning dial next to counter.
16. Slowly add sodium thiosulfide to sample by submerging the delivery tube into the sample. Swirl flask while you do this to mix.
17. When the sample turns pale yellow add 2 ml of starch (1 dropperful) to the sample; swirl to mix; the sample will turn blue/black. If the sample is pale yellow to begin with you can add the starch before you add any sodium thiosulfide.
18. Continue adding sodium thiosulfide with digital titrator, swirling as you add it, until sample is clear. **Go very slowly when the sample becomes pale so you don't overshoot the mark!**
19. Enter the number on the titrator onto the *data sheet*.
20. Put cap back on sodium thiosulfide cartridge, pull back plunger and remove cartridge from titrator.
21. Rinse all test containers with distilled water and replace in case.
22. All waste water or excess chemicals are put into a closed container to be diluted and flushed down a drain connected to a wastewater treatment system but not a septic system.

Turbidity meter

1. Place the meter on a flat, stable surface or leave in blue box.
2. Turn meter on (I/O button). Make sure the machine is in auto range (“auto rng” is indicated in lower left corner). If it’s not then push the range button until it shows this.
3. **Do an accuracy check using the bottles with numbered labels on top. If you have more than one site you only need to do the accuracy check at your first site.**
Here’s how to do an accuracy check
 - a. Place a drop of oil on bottle of 1st standard (around 5) and wipe off with the black cloth.
 - b. Insert it into the slot in the meter so that the white diamond on the bottle aligns with the mark at the front of the bottle slot on the meter.
 - c. Close lid and press the read button. Record results in the **logbook**.
 - d. **Follow the same procedure for the other two numbered vials** (one is around 50, the other around 500).
4. Rinse sample bottle with stream sample water 2 – 3 times. **If sample has been sitting then gently shake it before filling sample vial.**
5. Pour stream sample into the rinsed sample vial.
6. Wipe off vial with a soft, absorbent cloth.
7. Place vial in meter, being sure to align mark on vial with mark on meter.
8. Close lid, push the read button and record reading on *data sheet*.
9. When finished turn machine off, clean the sample vial with distilled water and return it to the box.

Conductivity & Water Temperature

1. **If you are the first person using the meter today you need to do an accuracy check.** If one has already been completed that day skip to 2. Accuracy check instructions:
 - a. After thoroughly rinsing probe and shaking off excess water place it in the container labeled “conductivity standard”.
 - b. Turn machine on and **make sure it is in temperature compensating mode**. This is indicated when the Celsius symbol (C°) on the bottom right is flashing. If it isn’t, push the mode button until you see this feature. Conductivity units are microsiemens per centimeter (μS/cm) and temperature is in C°
 - c. Stir probe slowly in the standard solution without touching the sides or bottom of the container. **Make sure the hole on the side of the probe is submerged and doesn’t have an air bubble trapped in it.**
 - d. When the reading has stabilized enter the conductivity and temperature reading in the **conductivity logbook**.
 - e. Put cover back on conductivity standard; **do not discard**.
 - f. Skip to 4.
2. Turn machine on. **Make sure it is in temperature compensating mode**. This is indicated when the Celsius symbol (C°) on the bottom right is flashing. If it isn’t, push the mode button until you see this feature. Conductivity units are microsiemens per centimeter (μS/cm) and temperature is in C°
3. Thoroughly rinse probe with distilled water and shake off excess water.
4. Measure water temperature and conductivity by placing probe into the blue bucket or the stream, being sure not to let the probe touch the sides of the container or bottom of stream. **Make sure the hole on the side of the probe is submerged and doesn’t have an air bubble trapped in it.**
5. When reading has stabilized record water temperature and conductivity on *data sheet*. (It’s ok if the last unit for the conductivity reading fluctuates. For example, if it goes back and forth between 104.5, 104.6 and 104.7, just pick the middle value.)
6. Rinse conductivity probe with distilled water before replacing it in the meter slot.
Turn machine off and return to bag, leaving the cord outside of the bag. Make sure the machine doesn’t accidentally turn on when you push it into its bag.