



## Citizens' Environmental Monitoring Program

# FIELD PROCEDURES GUIDE

April 2008

**The Anchorage Waterways Council (AWC)** is a 501(c) 3 non-profit membership organization, whose mission is to protect, restore, and enhance the waterways, wetlands, and associated uplands of Anchorage. Our members believe that environmentally healthy watersheds are a vital part of the high quality of life that we enjoy in Anchorage. We also believe that the beautiful creeks of Anchorage need a group specifically dedicated to advocating for their health and well being.

Central to fulfilling the AWC's mission is our **Citizens' Environmental Monitoring Program (CEMP)**. Since 1998, AWC has trained over 200 volunteer monitors to collect baseline water quality data which is used to identify water quality trends and detect pollution.

We appreciate your efforts in participating in this program and commend you on the stewardship role you have taken on in your local creeks. Let's keep the data flowing!

### OUR CONTACT INFORMATION

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## WATER MONITORING KIT CHECK LIST

- Goggles
- Watch
- Supply of Data Sheets
- Fine-point Sharpie & #2 pencil
- Rubber Gloves
- 2.5 Gallon Plastic Bucket
- Distilled Water/Wash Btl (2)
- Waste Containers (2)
- Camera (if available)
- Hand Warmers (if necessary)
- Cloth or Hand Towel

### Lamotte Shallow Water Monitoring Kit:

- 3 ml Pipets (2)
- MSD Sheets
- Borger Color System Booklet
- Air Thermometer (red fill)
- Water Thermometer (green fill)
- Turbidity Columns (2)
- Standard Turbidity Reagent (60 ml)
- Glass Stir Rods (2)
- 5 ml Test Tubes w/Caps (2)
- Octet pH Comparators (2)
- pH Indicator Solution
- 60 ml Water Sample Btls (3)
- 250 ml Water Sample Btls (2)
- Manganous Sulfate Solution (30ml)
- Alkaline Potassium Iodide Azide (30ml)
- Sulfuric Acid (30ml)
- Titration Vial w/Cap (20ml)
- Titration w/Plunger & Extension Tip
- Sodium Thiosulfate (60ml)
- Starch Indicator Solution (30ml)
- Hanna Combo Meter
- 100 ml Beakers (3)

- pH 7.01 Buffer Solution
- pH 4.01 Buffer Solution
- 1413  $\mu$ S/cm Conductivity Calibration Solution

### Lamotte Nitrate Nitrogen Kit:

- 5ml Test Tubes w/Caps (2)
- Octa-Viewer and Slide
- Nitrate #1 Tablets
- Nitrate #2 Tablets
- Safety Card
- MSD Sheets

### Hach Ortho-Phosphate Kit:

- Mixing Bottles w/Caps (2)
- Color Comparator Box
- Color Disc, 0-50 mg/L
- Viewing Tubes (2)
- Dropper
- PhosVer 3 Phosphate Reagent Powder Pillows (2+)
- Hach Instructions
- MSD Sheets

### Coliscan Bacteria Kit:

- Plastic Petri Dishes (2)
- Coliscan Easygel® (2 btls) [should be kept in freezer]
- 3 ml Pipette (2)
- Coliscan Colony Color Guide
- Micrology Labs Instruction Sheet
- Ice pack to keep sample cool until plated at home [should be kept in freezer]
- Incubator (box and light kit)

**ALWAYS KEEP CHEMICALS AND  
EQUIPMENT OUT OF REACH OF  
CHILDREN AND PETS!**

## GENERAL INFORMATION

### Kit Maintenance Procedures:

It is important to clean and properly stow all of your equipment and chemical reagents after each monitoring event. A few items, however, are designed to be disposed after one use. Single use items include: any pipette which comes in a sealed plastic wrapper, the pre-treated Petri dishes used in the Coliscan test and empty Coliscan Easygel® bottles.

**Note:** The Coliscan Easygel bottles should be stored in the freezer and 2 bottles removed the night before, or morning of, the sample. The ice pack should also be kept in the freezer and taken out right before you leave to go to your sampling site.

**Note:** Your Hanna Combo Meter should be stored upright with a small piece of sponge (soaked with pH 7 solution) in the cap. This helps maintain the pH probe.

### Cleaning Procedures for Test Tubes and Bottles:

- ✓ Rinse all glass and plastic test tubes/bottles thoroughly with tap water.
- ✓ Wash with phosphate free soap. Alconox cleaning powder is available at the AWC office. Use brush provided when necessary.
- ✓ Rinse thoroughly with tap water.
- ✓ Rinse three times with distilled water.
- ✓ Allow to dry before returning to kit. Keep tops off of bottles and tubes until fully dry.
- ✓ Wipe down inside and outside of kit with damp rag and then dry. Allow the inside of kit to completely dry.

**Note:** Do not re-cap test tubes or bottles after washing until completely dry, or mold will build up inside! Your color chart and other paper materials should be kept as dry as possible and stored in the zip-lock bags provided for them. All equipment should also be dried and properly stowed in its respective boxes. All equipment and supplies should be stored where they will not freeze or overheat.

### Disposal of Waste during the Sample:

NEVER pour waste or rinse water back into the sampling bucket! NO LIQUIDS are to enter the sampling bucket except the sample water itself. DO NOT pour rinse water back into sample.

Example: When rinsing test tubes for the pH test, fill test tubes with sample water from bucket and then discard rinse water outside of the bucket.

After completion of each test that requires the use of a chemical reagent, discard the reagent waste into the labeled waste containers (brown 250 ml bottles or otherwise designated bottle) provided.

### Disposal of Waste after the Sample:

When all tests have been completed, you have 2 choices for handling the waste that was generated:

- 1) Transfer waste from smaller waste bottles into a gallon jug and keep the jug until filled, then take to the Anchorage Waterways office for disposal. Make sure you clearly label any waste stored in your home.

OR

- 2) After each sampling event, flush waste down the sink, provided it is connected to the Anchorage sewer system. This is an acceptable method of

disposal as long as you are not connected to a septic tank.

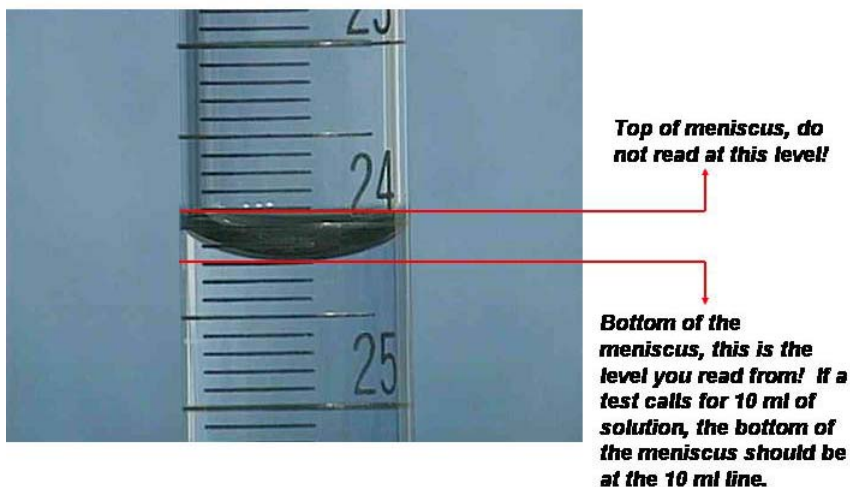
### Disposal of Used Petri Dishes (Bacteria Plates):

The easiest way to make used petri dishes safe for the regular garbage is to place 5 ml (about 1 teaspoon) of straight bleach onto the surface of the medium of each plate. Allow to sit at 5 least minutes and then place in a watertight bag and discard in trash.

## NOTES ON RECORDING DATA

### Meniscus Readings:

You'll notice in several test tubes and bottles that the surface of the solution may curve upward slightly; this curving upper surface is known as the meniscus. It's the bottom of the curve that should be even with the targeted level, not the portion near the walls.



### Decimal Places:

When recording your results, be sure to record the proper number of decimal places for that particular test.

Example: The water thermometer (green) reads to the nearest 0.5 °C. You should record 6.0 °C, not 6 °C. If the thermometer reads 6.5 °C, record 6.5 °C not 7 °C or 7.0 °C. However, the air thermometer (red) reads to the nearest 1 °F. This means your air temperature reading should be recorded as whole degrees, such as 6 °F or 7°F, not 6.0 °F, 6.5 °F or 7.0 °F.

**Note:** Additional information describing the range, precision, sensitivity and accuracy of the tests you are using can be found in your copy of the AWC Volunteer Training Manual.

### Reporting Your Volunteer Time:

In order to continue to secure funding for our volunteer monitoring efforts, it is important that the time you contribute to the CEMP program is recorded. Please record your total volunteer time (to the nearest ¼ hour) on each data sheet, as well as any mileage incurred by driving to the sample site or AWC office. In the winter you may visit your site and find that it is frozen and you can not sample. However, please turn in a datasheet and record the time spent traveling to check your site.

The following tasks should be included in the number of volunteer hours you report:

- ✓ preparing for sampling (including picking up supplies and cleaning kits),
- ✓ traveling to your site,
- ✓ completing the sampling and analysis procedures, and
- ✓ any clean up.

### **Data Quality Objectives:**

Data Quality Objectives (DQO's) are an important part of the CEMP program and they were established to ensure that the data you collect is suitable to use as a basic water quality inventory and to detect significant changes and trends. It is important that you check each parameter as you complete the data sheet to ensure the DQO for each parameter is met.

Examples: The water temperature DQO found on the data sheet states *“repeat if not within +/- 1.0 C”*. The turbidity DQO found on your data sheet states *“repeat if replicates are not within 1 addition of each other”*.

### **RECOMMENDED ORDER FOR TESTS:**

- 1) Calibrate Hanna Meter & record calibration numbers
- 2) Travel to site and hang your air thermometer
- 3) Record the following information on the data sheet: your name, the date, the time, your site ID
- 4) Collect water sample in bucket
- 5) Collect bacteria sample
- 6) Place water thermometer and Hanna Meter in bucket
- 7) Fix Dissolved Oxygen
- 8) Record Water Temp #1
- 9) Record site information (weather, sketch, photos, air temp)
- 10) Record water temp #2 (must be within 5 minutes of recording water temp#1)
- 11) Hanna readings
- 12) Note apparent color
- 13) Turbidity
- 14) colormetric pH
- 15) Titrate Dissolved oxygen

- 16) Ortho-Phosphate
- 17) Nitrate
- 18) Record total volunteer hours and check data sheet for completeness
- 19) Plate Bacteria
- 20) Clean equipment for next sampling event
- 21) Read bacteria plates and record bacteria data.
- 22) Adjust volunteer hours and check data sheet once more for completeness.
- 23) Return data sheet to AWC (by mail or drop off)

**Note:** Steps 1 and 19-22 should be completed at home. If, due to weather conditions, you wish to bring the bucket of sample water home, Steps 12-22 could be completed at home.

### **(1) Hanna Meter Calibration Procedures:**

Record the meter's identification number on the data sheet.

- 1) Soak the meter in pH 7.01 solution in a clean beaker for 5-10 minutes.
- 2) Fill 2 additional beakers, one with pH 4.01 and the other with conductivity solution 1413  $\mu\text{S}/\text{cm}$ .
- 3) While the meter is still submerged in 7.01 solution, turn the meter on by pressing the MODE button until the screen is activated.
- 4) Swirl meter in the beaker and after the readings have stabilized, record the pH and temp readings on data sheet. (if not reading pH, press SET/HOLD until it is in pH measurement mode)
- 5) To calibrate, press and hold the MODE button through the OFF reading until CAL, then release the button. It will indicate that it is calibrating by displaying 7.01 USE and the word CAL will flash in the lower left hand corner.
- 6) After calibrating, it will read 4.01 USE.

- 7) Remove the meter from the 7.01 solution and quickly rinse with distilled water and with a little pH 4.01 solution and place the meter in the beaker with pH 4.01 solution and swirl.
- 8) The meter will indicate it is calibrating by again flashing the word CAL in the lower left hand corner. When it is finished calibrating, the meter will flash 4.01 OK, the CAL will stop flashing, and the meter will display temperature again.)
- 9) Keep swirling for at least 30 seconds or until the pH reading stabilizes. Record the pH reading displayed and the temperature.
- 10) Rinse the meter thoroughly with tap water and distilled water and then submerge the meter in the beaker with conductivity solution.
- 11) Press the SET/HOLD button once to change to Conductivity mode. Continue swirling the meter in the beaker and after the conductivity reading has stabilized, record the Temperature and Conductivity readings on the data sheet.
- 12) To calibrate, press and hold the MODE button through the OFF reading until CAL, then release the button. It will indicate it is calibrating by displaying 1413 USE and the word CAL will flash in the lower left hand corner.
- 13) Once the calibration has been automatically performed, the meter will display OK for 1 second and then return to measurement mode.
- 14) Continue swirling the meter in the solution until the conductivity reading stabilizes, or bounces back and forth between two readings. Record this number on your data sheet.
- 15) Remove the meter from solution and rinse it and beakers with tap water and distilled water  
Dispose of calibration solutions according to chemical waste management procedures.
- 16) The unit is now calibrated and is ready for use.

**(2) Travel to Site and Set up Air Thermometer:**

Hang air thermometer (red liquid fill) in a shaded area at your site, near the sample bucket, to allow it to stabilize.

**(3) Record Information on Data Sheet:**

While waiting for air thermometer to stabilize, record the following information onto your data sheet: your name, the date, the time, the site ID (i.e., MaCam04v) and the monitoring kit number.

**(4) Collecting Your Water Sample:**

A few yards away, preferably downstream or down current from your exact sampling site, rinse the 2.5 gallon plastic bucket three times with water from the creek or stream that you are sampling. Now go over to your exact site, lower the bucket gently into the water, and fill it to a level about 2 inches from the lip of the bucket.

**Note:** If the water at your site is inaccessible because of a strong flow, your bucket should have a rope tied to the handle. After securing the other end of the rope to something solid, fill the bucket by turning it upside down and dropping it straight down into the water. This will help avoid the futility of having the empty bucket floating all over the surface and refusing to fill. If you are working in very shallow water, do not disturb the bottom while collecting the sample.

**(5) Bacteria:**

- 1) Use your Sharpie to mark the lids of 2 bottles of Coliscan Easygel™ with the numbers 1 and 5.
- 2) Use the sterile pipette included in your kit to carefully draw a 1 ml water sample from your sample bucket and deposit it into the Coliscan Easygel™ bottle you have marked as 1.

- 3) Repeat the process once more, this time carefully measuring 3 ml and deposit into the bottle marked 5. Recap the bottle. Then draw 2 ml and deposit into bottle marked 5 for a total of 5 ml.
- 4) Place the Coliscan Easygel bottles labeled 1 and 5 (which now contain 1 ml and 5 ml of sample water) on ice to keep within desired temperatures until plating is completed at home (see Note below).

**Note:** The next step in the bacteria test, “plating”, should be done when you get home. Plating should be performed within six hours of the sample and the Coliscan Easygel bottles that now contain sample water should be maintained at temperatures between 4 °C to 10 °C until plating occurs.

**(6) Place Hanna Meter and Water Thermometer:**

Clip the Hanna Meter on the edge of the bucket with the electrodes submerged in the bucket. Hang water thermometer inside sample bucket.

**(7) Dissolved Oxygen “Fixing”:**

**Note:** As you work through the DO testing procedure, you'll notice the emphasis to avoid trapping any air bubbles in the sample or splashing it around too much. The point is to avoid changing the amount of oxygen dissolved in the water by contact with the oxygen in the air.

- 1) Rinse each bottle with small amounts of water from the bucket three times. Rinse the outsides of the bottles and the caps as well. DO NOT pour rinse water back into bucket, empty rinse water outside of bucket.
- 2) Tightly cap the mouth of the bottle marked “A”. Holding the bottle sideways, submerge it to mid-depth in the sample bucket, and remove the cap

to allow the bottle to fill.

- 3) Turn the submerged bottle slowly to a vertical position (mouth up) and tap the sides with the cap to dislodge any air bubbles clinging to the inside. Hold the cap upside down under water so that no air is trapped in the cap. Screw cap back on bottle while the bottle is still submerged.
- 4) Retrieve the bottle and examine it carefully to make sure that no air bubbles are trapped inside. Once a satisfactory (i.e. bubble-less) sample has been collected, repeat Steps 2 through 4 with bottles "B" and "C".
- 5) Once all 3 bottles (A, B and C) are filled, uncap each bottle. Add 8 drops of manganous sulfate solution (pink reagent) to each sample.

**Note:** Drop the solutions in gently to avoid splashing and mixing in air. Hold the reagent bottles vertically, and do not allow the dropper tips to touch the sample.

- 6) Add 8 drops of alkaline potassium iodide azide (clear reagent) to each sample.
- 7) Cap each sample bottle carefully and mix by holding the bottle by the cap and repeatedly tipping the capped bottle back and forth in a gentle rocking motion for fifteen seconds. A fluffy, white to brownish precipitate will form.

**Note:** Avoid holding the bottles in your hand because it may change the temperature of the water and affect the DO reading. It is better to hold onto the cap and touch the bottles as little as possible, while still mixing the bottle enough so that the precipitate forms.

- 8) Set the bottles in their holes in the LaMotte Shallow Water Monitoring Kit; the Styrofoam will help keep the samples at a constant

temperature. Allow the precipitate to settle a third of the way down the bottles (past the neck and down to the shoulder of the bottle), so that it fills only the bottom two-thirds.

- 9) Add 8 drops of sulfuric acid (clear solution, red cap) to each bottle and cap the bottles.
- 10) Mix by tipping gently as before, until the precipitate has dissolved.
- 11) Record the time and temperature of the water in the bucket at this time.

**Note:** The DO samples are now “fixed”. Maintain samples between 4 C° to 10 C° until “titration” is completed. Titration can be performed later at home, up to six hours after fixing.

#### **(8) Water Temperature Reading #1:**

Read the thermometer and record as Rep #1 on data sheet. Be sure to keep half of the thermometer in the water while taking the reading. Take second replicate within 5 minutes of first.

#### **(9) Record Site Information:**

While waiting to take the second water temperature reading, record weather, sketch, photos, and air temperature. Report on any precipitation that has fallen in the last 24 hours, making your best estimation of the amount (i.e., trace, under an inch, several inches, heavy, etc.). When recording wind, simply record if it is calm, steady or variable and then refer to the Beaufort Wind Scale on the back cover of this guide. Under Sample Location, check the appropriate descriptions for depth and bottom.

Take up to three photos: 1) downstream view 2) upstream view 3) anything out of the ordinary or noteworthy (dead fish, construction, etc.)

**Note:** the Beaufort Wind Scale is located on the back cover of this guide.

#### **(10) Water Temperature Reading #2:**

Read the thermometer and record as Rep #2 on data sheet. Be sure to keep half of the thermometer in the water while taking the reading. This reading should be taken within 5 minutes of first.

*(Data Quality Objective: Repeat if Rep #2 is not within +/-1.0 °C of Rep #1).*

#### **(11) Hanna Meter Readings**

- 1) After the meter has soaked in the sample water for at least 10 minutes, turn on the meter.
- 2) Gently swirl the meter in the sample bucket. After readings have stabilized, record the initial temperature.
- 3) Continue to swirl the meter in the water. Press SET/HOLD until the conductivity is displayed. Wait 15 seconds and record the first of 3 conductivity readings.
- 4) Press SET/HOLD again and wait 15 seconds. Record the first of 3 pH readings.
- 5) Press SET/HOLD once more and wait 15 seconds. Record the first of three (3) TDS readings.
- 6) Repeat Steps 3-5.
- 7) Repeat Step 6. Continue recording additional readings until QAOs are met for each parameter
- 8) Record the temperature and turn the Hanna Meter off.

### (12) Apparent Color:

- 1) Look at the color of the water in your sampling bucket and record a one or two word description (i.e., the apparent color).
- 2) Take the Turbidity Column marked "S" for sample water and fill it to the 50 ml line with water from the bucket and record its apparent color.

**Note:** If you have a Borger color book, find the color that most closely matches the sample water and record that. If it is in between two colors, both colors may be recorded. The Borger color books are currently out of print and we hope they will become available in the near future.

### (13) Turbidity (Clarity):

- 1) Take the Turbidity Column that you filled with sample water for determining Apparent Color. Make sure it is filled to 50 ml. Check that you can see the black dot at the bottom of tube. If not, empty some water so that the tube is 25 ml full.
- 2) Fill the second Turbidity Column, marked "D", with distilled water equal to the amount of sample being measured (e.g. 50 ml or 25 ml). This is the distilled water or "clear water" tube. Indicate the sample volume being used on your data sheet.

**Note:** A 50 ml sample should always be used unless the water is so turbid that you can not see the black dot at the bottom of the tube. Only in that case should a 25 ml sample be used. If the tube is filled with 25 ml of sample water and you still cannot see the dot, record the turbidity as "greater than (>) 200 JTU," otherwise, go to Step 3.

- 3) Place both tubes side-by-side with the column filled to note color, and note the difference in clarity between the two. If the water in the sample tube ("S") is less clear than the distilled water ("D"), go to Step 4. If the black dot is equally clear in both tubes, then the turbidity of the sample water is zero, and record the result as 0 additions.
- 4) Shake the Standard Turbidity Reagent bottle vigorously before each addition. Add 0.5 ml to the clear water tube (distilled water tube marked "D"). Stir contents in both tubes to re-distribute the turbid particles. Check the amount of turbidity by looking down through the solution at the black dot. If the turbidity of the sample ("S") remains greater than the clear water tube (distilled water tube "D"), continue to add Standard Turbidity Reagent in 0.5 ml increments to the sample tube ("S"). Stir after each addition until the turbidity in each tube appears equal. Record the total number of increments/additions of the Standard Turbidity Reagent that were added.

**Note:** You are recording the number of 0.5 ml additions of reagent that you added. If you added two 0.5 ml additions, record 2 on your data sheet, not 1.0 ml.

- 5) Record the temperature of the water in the bucket at the time of the turbidity reading.
- 6) Rinse each tube 3 times with distilled water and repeat Steps 1-3.

*(Data Quality Objective: Repeat if replicates are not within 1 addition of each other.)*

#### (14) Colormetric pH:

- 1) Rinse 2 small test tubes with sample water three times. Fill each tube to the 5 ml line with sample water.
- 2) While holding the dropper vertically, add ten (10) drops of the green Wide Range Indicator Solution to each test tube.
- 3) Cap, invert and shake each tube several times to mix.
- 4) Remove the caps and insert each tube into the Octet Comparator (Black Box) and match sample color to appropriate color standard.

**Note:** Hold the comparator up so that light enters through the special light-diffusing screen in the back, but avoid viewing the comparator against direct sunlight or an irregularly lighted background. Make sure caps are off of tubes to help with light filtration.

- 5) Read each pH measurement to the nearest 0.25 value, and enter the result for each sample on the datasheet. If there is a significant difference between the 2 measurements (i.e., >0.25 pH unit difference), then make a note and repeat the test.

*(Data Quality Objective: Record to the nearest 0.25 pH units. Repeat if replicates are not within 0.25 units.)*

#### (15) Dissolved Oxygen "Titration":

**Note:** To assure more precise dissolved oxygen measurement, three 60 ml samples will be prepared for titration. You will begin by titrating a 20 ml portion of each of these samples.

- 1) Rinse the titration vial (it is labeled "Code 0299" and has a flat lid with hole in the center) with a small amount of the solution from the

sample bottle, and then fill it to the 20-ml line. Snap on the titration vial cap.

- 2) Depress the plunger of the direct-reading titrator (the small syringe) to expel air. Holding the plunger tightly down, insert the titrator into the plastic fitting of the bottle of sodium thiosulfate (titrator) solution. Invert the bottle and withdraw the plunger slowly until the bottom of the plunger is about half an inch past the zero mark on the titrator scale.

**Note on Preventing Bubbles:** As you start to withdraw the plunger, inspect the solution filling the syringe, watching for air bubbles, especially at the tip of the plunger or in a silvery rim around the tip. If bubbles appear while you've only got a small amount of solution in the titrator, pump the solution back into the thiosulfate bottle, pressing the plunger down quickly and firmly. Bubbles tend to be a particular problem when the dry titrator is filled for the first titration of the day. It may be necessary to pump the solution back and forth several times to get the plunger surface wetted. Once you've gotten a small amount of sodium thiosulfate solution into the titrator without bubbles, continue to inspect for bubbles as you slowly withdraw the plunger. If you spot a bubble when the titrator is nearly full, remove the titrator from the thiosulfate bottle, hold it over your wastewater bottle, and press the plunger down until the bubbles are expelled. Reattach the titrator to the thiosulfate bottle and continue filling to the zero mark. Inspect the titrator carefully for air bubbles.

- 3) Insert the titrator into the central hole of the titration vial cap. Add one (1) drop of sodium thiosulfate and swirl the tube (with the titrator still attached) to mix it. Continue this titration process one (1) drop at a time until the yellow-

- brown solution in the tube just begins to fade or get lighter. The solution should be a pale yellow color - about the shade of pale straw.
- 4) Gently remove the titration vial cap with the titrator still attached. Be very careful not to change the position of the plunger or to shake any fluid loose from its tip. Add 8 drops of starch indicator solution to the titration tube.
  - 5) Replace the cap with the titrator carefully on the titration vial and swirl until the solution turns a uniform blue. Continue the titration process described in Step 3. Be sure to gently swirl after each drop. Continue the titration until the solution turns from blue to clear - the first complete disappearance of the blue color is the endpoint of the titration. (If the solution turns blue again a moment later, ignore it.) Hold the solution against a sheet of white paper (for example, your data sheet) to check the color.
  - 6) If your sample has a high oxygen content, you may have to refill the titrator in order to reach the endpoint. Do not completely empty the titrator into the titration sample. The plunger should be lowered only far enough so that the lowermost tip of the green plunger disc is level with the 10-unit mark on the scale. If you reach this point without hitting the endpoint of the titration, remove the titrator from the titration vial. Refill the titrator to the zero mark again as described in Step 3 and continue.
  - 7) Read the total number of units of sodium thiosulfate used in the titration from the scale opposite the lowermost tip of the green plunger disc. The divisions are in 0.2 units, but you should be able to read the results to the nearest 0.1 units.

- 8) If you had to refill the titrator, remember to add in the ten units to your recorded measurement. The number of units used equals the milligrams per liter (mg/l) of oxygen dissolved in the water. Record this figure on your data sheet to the nearest 0.1 mg/l.
- 9) Carry out Steps 3 to 8 on the sample bottles marked "B" and "C".

**Note:** If any 2 titration readings differ by 0.6 mg/l or more, titrate another 20 ml sample from the bottle whose reading fell outside the 0.6 mg/l range. If the second titration still shows a value different from the others by 0.6 mg/l or more, do not check the use sample box on the data sheet for that sample. If no 2 of your 3 original readings fall within a 0.6 mg/l range, repeat Steps 2 through 9 using 3 new 20 ml portions of each sample. Record the results of all titrations (even those you suspect are in error) and only check the use sample box for samples that meet the DQO. Discard the contents of the sample bottles in your wastewater bottle.

*(Data Quality Objective: Repeat if the 3 replicates are not within 0.6 mg/l).*

#### **(16) Ortho-Phosphate:**

- 1) Rinse 2 square mixing bottles 3 times with sample water and then fill them to the 20 ml mark with sample water.
- 2) Add the contents of one PhasVer 3 Phosphate Reagent Powder Pillow to the each bottle and swirl to mix. Be careful not to shake the bottle vertically.
- 3) Wait 8 full minutes for color development. If Phosphate is present, a blue violet color develops.

- 4) Fill a test tube to the top line (marked with the no. 1730) with sample water.
- 5) Fill the other test tube to the top line (marked with the no. 1730) with prepared sample water.
- 6) Place the second test tube in the top right opening of the Color Comparator.
- 7) Hold the Color Comparator with the test tubes tops pointing toward a light source such as the sky, window or lamp. For better results, rotate the color disc until the color matches in the two openings.
- 8) Write down the result as a fraction, with your result over 50 (i.e., 2.5/50)
- 9) Note the shade of blue (clear, faint, light, medium, dark) of the sample on the data sheet.
- 10) Discard the prepared sample in waste bottle and rinse the test tube thoroughly with distilled water (at least 3 times.) Repeat Steps 1-9 for sample 2.

*(Data Quality Objective: Repeat if replicates are not within 2.5 units.)*

**(17) Nitrate Nitrogen:**

- 1) Rinse 2 square test tubes from your LaMotte Nitrate Nitrogen Tablet Kit three times with sample water and fill to the 5 ml line with water from your sample bucket.
- 2) Add one Nitrate #1 Tablet to the tubes. Cap the test tubes and mix by inverting repeatedly until the tablet dissolves completely.
- 3) Add one Nitrate #2 CTA Tablet to the test tubes. Cap the tubes again and mix until the tablet dissolves completely. Wait for 5 minutes.
- 4) Insert the Nitrate-N color slide into the Octa-Slide viewer.
- 5) Insert the first test tube into the top of the slide

viewer.

- 6) Note the shade of pink (clear, faint, light, medium, dark) of the sample on the data sheet.
- 7) Match the sample color to a cell of the color slide and record the number of that slide as Nitrate-Nitrogen in ppm on your data sheet.

*(Data Quality Objective: Repeat if replicates are not within 0.5 mg/l.)*

**(18) Record Volunteer Hours and Check Datasheet for Completeness:**

Check for completeness of the data sheet and its legibility and have all team members sign the datasheet. Record the total amount of hours (to the quarter hour) it took to complete this sample.

**(19) Bacteria Plating and Incubating:**

- 1) Turn on the incubator and insert the air thermometer into a hole near the bottom.
- 2) Mark the lids (the larger half) of two pretreated Petri dishes for the two amounts: 1 ml and 5 ml. (Keep your writing close to the edge of the lids). Match the bottles of Coliscan-water mixture to the Petri dishes marked with the same number. One at a time, pour each bottle of Coliscan-water mixture into the bottom half (the smaller half) of its respective Petri dish. Cover the dishes with the designated lids and gently swirl the liquid so that it covers the entire bottom of the dish.
- 3) Record the time and date plated on your datasheet.
- 4) Place the Petri dishes in the incubator. After about 30 to 40 minutes the Easygel™ will set into a gel form. Once this occurs turn each entire Petri dish over and continue incubating.
- 5) Periodically check the temperature of your

incubator and adjust the flaps accordingly, if necessary. The temperature in the incubator should remain between 85-99 °C.

- 6) Incubate for 48 hours and then proceed to Step 21 to count bacteria.

**(20) Clean equipment so it is ready for the next sample and dispose of waste properly.**

Cleaning Procedures for Test Tubes and Bottles:

- ✓ Rinse all glass and plastic test tubes/bottles thoroughly with tap water.
- ✓ Wash with phosphate free soap. Alconox cleaning powder is available at the AWC office. Use brush provided when necessary.
- ✓ Rinse thoroughly with tap water.
- ✓ Rinse three times with distilled water.
- ✓ Allow to dry before returning to kit. Keep tops off of bottles and tubes until fully dry.
- ✓ Wipe down inside and outside of kit with damp rag and then dry. Allow the inside of kit to completely dry.

**Disposal of Waste after the Sample:**

When all tests have been completed, you have two choices for handling the waste that was generated:

- 1) Transfer waste from smaller waste bottles into a gallon jug and keep the jug until filled, then take to the Anchorage Waterways office for disposal. Make sure you clearly label any waste stored in your home.

OR

- 2) After each sampling event, flush waste down the sink, provided it is connected to the Anchorage sewer system. This is an acceptable method of disposal as long as you are not connected to a septic tank.

**(21) Read Bacterial Plates:**

After plates have incubated for 48 hours (see Step 19), count the bacterial colonies as follows and record on data sheet:

- 1) After 48 hours have passed, count the number of dark purple and dark navy blue colonies that have formed in the Petri dish. This is the *E. coli* count for this sample.
- 2) Count the number of pink or red colonies, then add this amount to the *E. Coli* count. This is the total coliform count for the sample.
- 3) Count the number of teal colonies.
- 4) Record the teal colonies, *E. Coli* and total coliform counts for each sample (1 ml and 5 ml) on your Monitor Data Sheet.
- 5) Record the day and time you read your bacteria plates on your datasheet.

**Note:** Please use the Coliscan Color Guide provided in your Volunteer Manual as an aid in determining colors of colonies if uncertain. Also, if the sheer number of bacteria that have grown in your petri dish plate make counting difficult, you can divide your plate into quarters and count one quarter at a time, or count one quarter and multiply by 4.

**(22) Adjust Volunteer Hours as Needed and Check Datasheet Once More for Thoroughness**

**(23) Dispose of Bacteria Plates Properly:**

The easiest way to make used petri dishes safe for the regular garbage is to place 5 ml (about 1 teaspoon) of straight bleach onto the surface of the medium of each plate. Allow to sit at 5 least minutes and then place in a watertight bag and discard in trash.

### (24) Return Data Sheet to AWC:

It is important to be timely in returning your completed data sheet. Please turn your data sheet in as soon as possible (within a week of sampling)! Either by mail or in person. This helps us in several ways:

- 1) If we have questions about your data, you will be able to provide more accurate information to us if we can follow up shortly after the sample, rather than several months later.
- 2) Also, if you make note on your data sheet of a problem at your site (erosion, construction, dead fish, etc.) it is better if we have your data sheet in hand sooner rather than later.

Remember, you are putting a lot of effort into collecting this data. By turning in your data sheet in a timely manner, we can be sure we are making the most of the data and your efforts!

### Beaufort Wind Scale

Beaufort Scale	Speed MPH	Description
<b>0</b>	below 1	<b>Calm:</b> smoke rises vertically
<b>1</b>	1-3	<b>Light Air:</b> Smoke drifts; leaves barely move
<b>2</b>	4-7	<b>Light Breeze:</b> Leaves rustle; wind can be felt
<b>3</b>	8-12	<b>Gentle Breeze:</b> Leaves and twigs move; debris and dust raised from ground
<b>4</b>	13 -18	<b>Moderate Breeze:</b> Small branches move; debris and dust raised from ground
<b>5</b>	19 - 24	<b>Fresh Breeze:</b> Small trees sway and large branches in motion; dust clouds raised
<b>6</b>	25 - 31	<b>Strong Breeze:</b> Large branches continuously move; wind whistles; difficulty using and umbrella
<b>7</b>	32 - 38	<b>Moderate Gale:</b> Large trees sway; difficulty walking
<b>8</b>	39 - 46	<b>Fresh Gale:</b> Twigs and small branches break; walking very difficult
<b>9</b>	47 - 54	<b>Strong Gale:</b> Slight damage to buildings; shingles blow off roof
<b>10</b>	55 - 63	<b>Whole Gale:</b> Large trees uprooted; heavy damage to buildings
<b>11</b>	64 - 72	<b>Storm:</b> Widespread damage
<b>12</b>	above 73	<b>Hurricane:</b> Severe damage and destruction