Illinois Stream Team: Monitoring Streams in the Prairie State

Volunteer Handbook

2nd Edition – Spring 2005

Developed by Prairie Rivers Network

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Contents

Introduction

Welcome to Illinois Stream Team, a new volunteer monitoring program that allows you to investigate a few of the chemical and physical aspects of water quality. Through this program we encourage you to develop your own goals for your monitoring, design and implement a monitoring plan that would best achieve those goals, and share the information you collect with other volunteers around the state. Because we are offering this program as a tool that you can tailor to meet your monitoring needs, this document is a combination manual and workbook. We strongly encourage you to think through the several site-specific components described in this manual as soon as possible to make your monitoring as effective and exciting as possible.

Value of the Data Collected

Your monitoring kit is not comprised of the most sophisticated equipment that money can buy. However, if you use good techniques, the data you collect can be very useful in answering important questions. This data should help you identify places with relatively good water quality as well as places where water quality is poor and may be causing problems for fish and other aquatic life.

Illinois EPA is not currently using volunteer monitoring data for any regulatory purposes, but the data is still important for the Agency. If you identify problems through your sampling, you should report them to IEPA immediately; they may be able to conduct subsequent monitoring with more sophisticated equipment to confirm and further investigate the problem. If IEPA is not able to respond with additional monitoring, you may also wish to hire a consultant to do more sophisticated monitoring.

Finally, we are developing a Quality Assurance Project Plan which will help state and federal agencies better understand the precision and accuracy of your data. We hope this will ultimately demonstrate that your data is acceptable for a variety of uses beyond those you identify for yourself.

Contacts

For more information about the program, contact Prairie Rivers Network at 217-344-2371 or info@prairierivers.org .

Your Monitoring Plan

As mentioned above, you can tailor your monitoring program to investigate water quality issues in a way that is meaningful and helpful for you. You are encouraged to think about why you want to conduct monitoring. Your sampling program should then be designed to best achieve those goals within the time and resource constraints of your practical lives. In designing your program, you will need to decide where you need to sample, how frequently you need to sample, and which tests will be most important.

Do not feel intimidated or burdened by the monitoring design considerations. If you want to start by simply testing under the bridge near your house, get out and do that. You and your watershed organization can develop more detailed plans as you refine your goals for the program. Prairie Rivers Network staff are also available to assist your organization in tailoring your program to meet your needs.

I. Your Watershed

Before developing the sampling plan for your watershed, it is helpful to know what types of land uses and activities are found in the watershed that might affect water quality. Please write a description of the watershed that you will be sampling, and include the description on the worksheet on page 8. Use IEPA's mapping tool (online at http://maps.epa.gov/enviromapper/) to identify industrial and sewage treatment plant wastewater discharges in the watershed. Identify land uses (agriculture, park lands, urban lands) in the watershed. Identify other activities in the watershed that may affect water quality. Collect other existing information on the quality of the waters in your area from government agencies and academics. Prairie Rivers Network also recommends you complete a water quality Visual Assessment every few years as changes in the characteristics of the watershed occur. This survey form is included as Appendix D.

II. Goals

Articulating clear reasons for participating in your monitoring program will help you motivate yourself and the members of your group to stick with the program and feel rewarded as you begin achieving your goals. Setting goals for your monitoring program also helps you determine which monitoring tests to perform, where to per-

form them, and how often to perform them. A few possible goals for your monitoring program are offered for your consideration below. Please identify which ones are important for your program and/or write additional goals on the worksheet on page 8.

- Raise local awareness of the quality of local waters.
- Increase local interest in the protection of our watershed.
- Investigate potential impact of a pollution source.
- Increase interest and participation in our watershed organization.
- Identify potentially impaired waters in our watershed.
- Identify the healthiest waters in our watershed.
- Identify priority areas for better protection.
- Document trends in water quality over a long term.
- Compare water quality in our streams to water quality in other streams around the state.

III. Site Selection

You and your watershed organization should identify the locations which you will monitor. We encourage you to consider the following factors when selecting sites. Don't be too ambitious in the beginning; taking on more than you have time to do may cause frustration and burn out.

- *Safety.* Is there safe, convenient access to a flowing section of the stream? Can you safely reach the site year round?
- *Do you have permission to monitor the site?* If you plan on monitoring a site that is on private property, landowner permission must be obtained.
- *Will data from your sites allow you to satisfy your goals?* For example, if you would like to increase awareness of local water quality, it may be useful if you have at least one site to which you can easily bring local officials and local media. If you are trying to determine the effects of a pollution source, you will want to select sites both upstream and downstream of the source.
- *Is the site representative of the watershed?* This is important if you are trying to collect data that is representative of the watershed. However, if you are trying to assess the impact that localized activities may have on water quality, this is not as important.
- *Is there enough space at the site to conduct the monitoring?* After training, you should know what kind of space you need on site.
- *Are any other groups monitoring the site?* If somebody is already monitoring at

the site, your time may be better spent at other sites.

- *Can the site be identified on a map and on the ground?* People using the information need to know where the site is and what activities occur in the watershed near it. It is also important to be able to locate the site for safety reasons.
- *Does the site have water in it all year long?* Since monitoring will take place during all seasons, choose at least some sites that have water year round.

IV. Monitoring Frequency and Timing

Because chemical and physical quality of streams varies considerably depending on several factors including weather, season, time of day, and activities in the watershed, choosing the frequency and timing of your sampling requires careful consideration. Your goals may help you make these decisions. For example, if you are trying to determine the impact that stormwater has on water quality, you should be sure to collect data during dry periods and after rainfalls. If you would like to compare your data to data collected in other streams or document long term trends in your waters, you need to collect data frequently enough to capture multiple weather conditions and times of day in each season. At a minimum, we ask that you collect and submit data at least quarterly.

V. Parameters

Your kit contains the equipment necessary to collect data on temperature, pH, dissolved oxygen, alkalinity, nitrate, orthophosphate, and turbidity. These are all important parameters, and we ask that you conduct each of these tests at your sites at least quarterly. Materials and instruction are provided for simplistic stream flow monitoring as well. This is also an important parameter, but it may require more time than you have available. If determining stream flow becomes too time consuming and is not critical to your goals, you may wish to conduct this test less frequently.

As with the other elements in your monitoring plan, your goals may suggest that you focus your attention on specific parameters. If you are investigating the affect that runoff from construction may be having, you may want to collect turbidity data before and after several rainfalls in one season. If you want to explore dissolved oxygen fluctuations during one day, you may want to perform the dissolved oxygen test several times in one day, including before dawn. You may also want to purchase equipment to test for additional parameters that may have specific significance in your watershed.

Your Monitoring Plan

I. Watershed Description

II. Goals

III. Sites to Monitor (also attach a map)

IV. Anticipated Monitoring Schedule (including tests to be conducted)

Safety First!

You have chosen safe, convenient, and accessible sites to monitor; you have decided when to monitor; and you have identified the tests you plan to conduct. Now you are ready to go out and start collecting data. Before you leave the house, though, remind yourself and your sampling partners of the following safety instructions.

General Safety Precautions

- Monitor with at least one other individual. Never monitor alone.
- Always let someone else know where you are going.
- Someone in the group should bring a cell phone. If no one is able to, know the location of the nearest telephone and the number.
- Know where the nearest medical center is and be able to direct emergency personnel to your sampling site.
- Each person should have a medical form with emergency contacts, insurance information, and pertinent health information
- Have a first aid kit handy.
- Know the weather reports: don't go sampling if severe weather is predicted, and cease sampling if weather gets stormy.
- Park in a safe location, out of the way of other drivers
- Put wallet and keys in a safe place. (Water tight bag tied to your belt is a good idea. Locked in the car is a bad idea, particularly for the keys.)

Protecting yourself while in the stream

- Wear foot protection; don't go monitoring barefoot. Boots or old tennis shoes are recommended.
- Make sure your tetanus shot is up to date.
- Wear a life jacket in deep water. Don't wade into swiftly flowing areas.
- Avoid getting stream water in your eyes, nose, mouth, or any breaks in your skin.
- If the stream water looks peculiar or has a strong odor, exercise extreme caution. Avoid contact with the water by using waders and gloves. Be sure to wash hands thoroughly. You may wish to bring antibacterial gel in your kit to use after sampling at each site. Otherwise, be very careful and do not eat or touch your face until you are able to wash your hands with soap and clean water.

Protecting yourself and your equipment

- Be familiar with the test procedures before you begin. Obey all precautions.
- Read the label on each reagent container before use for precautions or antidote information.
- Review the Material Safety Data Sheets (MSDS) for the reagents contained in your kits. These sheets can be found online at www.hach.com under the sidebar heading "Tools" and at www.lamotte.com/pages/common/msds/msdslook.cfm .
- The Illinois Poison Control Center number is (800) 222-1222. In the case of accident or suspected poisoning, have the name of the reagent and LaMotte reagent code number on hand. If you cannot find the code number on the container, look in Appendix B for a cross listing. If you suspect poisoning by a Hach reagent (from the Phosphate kit), call Hach's 24 hour poison line at (303) – 623-5716. The phosphate kit number is 2248, model PO-19.
- Avoid contact between reagent chemicals and eyes, nose, mouth, and skin. Use gloves to protect hands.
- Never use your fingers to cover test tubes during shaking or mixing; use caps or stoppers.
- If a spill occurs, try to collect the contaminated sediment in a plastic bag and dispose of it properly.
- Before and after tests, rinse test tubes and sample bottles 3 times with distilled water. Dry outsides as well as your hands.
- Do not interchange caps from different containers, and keep all reagent containers tightly closed.
- Keep kits and kit contents away from prolonged exposure to the sun. Store kits (especially reagents) at room temperature, keeping them away from extremely high temperatures and freezing temperatures.
- Pay attention to expiration dates on reagents. Notify Prairie Rivers Network of any upcoming expiration dates

Disclaimer: These are safety recommendations to be considered by volunteer monitors during their monitoring activities. However, Prairie Rivers Network makes no representations that these recommendations will protect individuals from injury or harm to property. Participation in this monitoring program is voluntary, and Prairie Rivers Network makes no representations that any of its employees or agents will be present to monitor the manner in which the work is performed. Prairie Rivers Net-

work has no knowledge of the training or experience of persons who may be participants in this program or the types of conditions that may be encountered by participants.

Equipment List

Included in Kits:

ERTCO Armored Pocket Thermometer
LaMotte Dissolved Oxygen Field Kit
LaMotte pH Field Kit
LaMotte Total Alkalinity Field Kit
LaMotte Nitrate-Nitrogen Field Kit
Hach Phosphate Field Kit
Ohio Sediment Stick
Tape measure
1 large jar for waste
1 small jar for rinsing
One pair gloves
Tennis ball
Volunteer Monitoring Handbook with data sheets

Not Included but Recommended:

First Aid Kit
Disinfecting gel
Watch or Stopwatch
Paper Towels
Pen or Pencil
Scissors
Distilled or clean tap water
Plastic bag for garbage
Waders or shoes to go into the stream (optional)
String
4 Stakes

Procedures

General Practices

Before going out, be sure that you wash your sample bottles and jar with phosphate-free detergent and rinse them very thoroughly with tap water. Use a pipe cleaner to ensure that all dirt particles are removed during cleaning.

Before collecting stream water for your chemical tests, rinse your jar with stream water at the sampling site several times. When collecting your sample, submerge the jar in flowing water upstream of where you are standing and upstream of any areas through which you have walked. Fill the jar with water collected approximately halfway between the bottom of the stream and the surface of the water. Hold the bottom of the jar so that the water does not flow through your hand as it fills the jar. Do not touch the sample water or put anything in the sample water.

Before beginning your chemical tests, rinse your sample bottle three times with sample water by pouring it out of the jar into the bottle. Be extremely careful to avoid contaminating reagents as you conduct the tests.

After each day of monitoring, empty the waste beaker down the sink with plenty of tap water. Rinse the jar out repeatedly, as well as the rinse water jar, with clean tap water. If you are not comfortable with disposing of the waste down your sink, you can place a piece or two of construction paper or cardboard at the bottom of a pan or tray, poor the waste over it and allow the liquid to evaporate, leaving the residue on the paper, which you can throw in the garbage after a couple of days. If you choose to use this method, be sure to set it up somewhere out of the way; outside where no animals can get into it is ideal. If you have lots of liquid to dispose of, consider evaporating it in batches rather than all at once.

Standard Operating Procedures

Each of the following tests must be performed at the site immediately after collection.

Each chemical test should be conducted at least twice. If the results of the two tests are not similar, repeat the test a third time.

The order of testing is not crucial, but we suggest water observations first, followed by air then water temperature, total suspended solids, chemical tests, and lastly the stream flow. Air temperature must be taken before water temperature. When you begin the chemical tests, you may want to start by fixing the dissolved oxygen, then starting nitrogen-nitrate, and while nitrogen-nitrate incubates for five minutes, measure pH, then complete nitrate-nitrogen. Move on to alkalinity, orthophosphate and finally finish dissolved oxygen. Taking total suspended solids before the chemical tests reduces the chance that you will stir up and then suspend bottom sediment, causing a false TSS reading. Record all data on the data sheet.

1) Water Observations

These observations are somewhat subjective, but do provide useful information. Note on the data sheet (Appendix C) the water color and odor, any floating substances, and substances coating the streambed.

Materials

Rinse jar
White sheet of paper (a page from the handbook works well)

Procedure

In order to see the color of the stream water accurately, collect a sample of water in the rinsing jar and place a white sheet of paper under or behind it. Use this sample to note the water odor as well.

2) Temperature

Materials

Armored pocket thermometer

Procedure

Take air temperature first. Hold thermometer in the shade for 1 or 2 minutes, or until the thermometer reading is steady, before reading the temperature.

Hold thermometer directly in the stream for 1 or 2 minutes, or until the thermometer reading is steady, before reading the water temperature.

3) pH

Materials

LaMotte Precision pH kit
Waste jar and rinse jar

Procedure

1. Fill tube with sample water 3 times, emptying into waste beaker. Fill tube to mark with sample water.
2. Add 10 drops of WR Ind, holding bottle straight up. Cap tube and mix.
3. Insert tube into color comparator with matching color, compare and record pH.
4. Rinse tube 3 times with distilled or tap water, emptying into waste beaker.

4) Total Suspended Solids

Materials

Ohio Sediment Stick

Procedure

These instructions were developed by the Lake Soil & Water Conservation District of Painesville, Ohio and can be found on the yellow sheet accompanying the Ohio Sediment Stick as well.

1. Position the stick near the center of the stream halfway in between the surface and the bottom of the streambed, with its open end upstream to fill with water.
2. Holding the stick in your shadow and perpendicular to the ground, pour out water until you can just see the 0.4 inch black dot target on the tube bottom.
3. Rock the tube as needed to keep material suspended.
4. Read the height of the water column from the markings on the stick to the nearest 1/4” (inch).
5. Repeat this procedure once more.
6. Use the table on the following page to estimate total suspended solids. Table is based on Anderson and Davic, 2001.

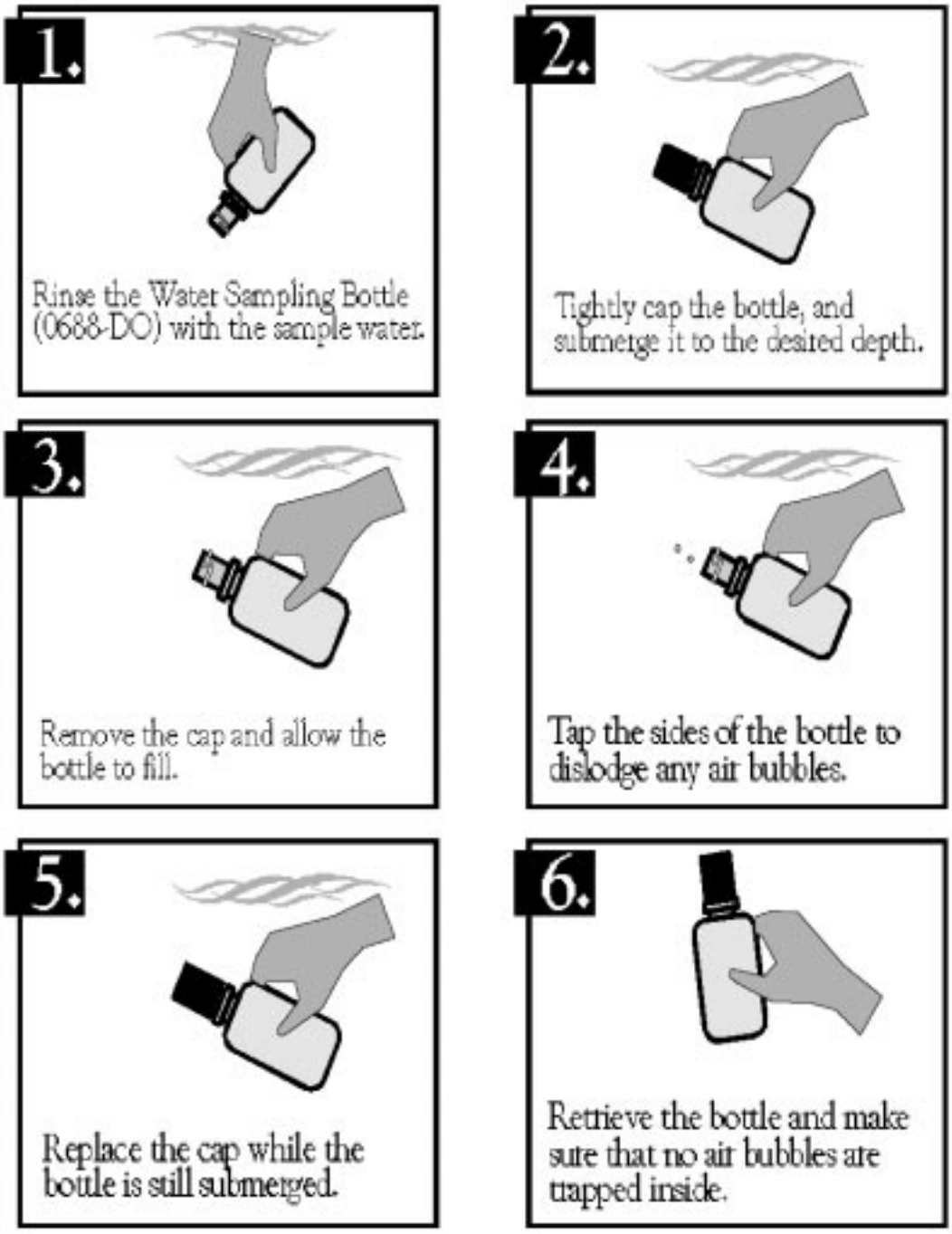
Stick(in)	TSS(mg/l)	Stick(in)	TSS(mg/l)	Stick(in)	TSS(mg/l)
0.5	1751.2	10.0	33.7	24.0	10.6
1.0	701.9	11.0	29.7	25.0	10.1
1.5	411.2	12.0	26.5	26.0	9.6
2.0	281.4	13.0	23.8	27.0	9.1
2.5	209.6	14.0	21.6	28.0	8.7
3.0	164.8	15.0	19.7	29.0	8.3
3.5	134.5	16.0	18.1	30.0	7.9
4.0	112.8	17.0	16.7	31.0	7.6
4.5	96.6	18.0	15.5	32.0	7.3
5.0	84.0	19.0	14.4	33.0	7.0
6.0	66.1	20.0	13.5	34.0	6.7
7.0	53.9	21.0	12.7	35.0	6.5
8.0	45.2	22.0	11.9	> 36.0 =	< 5.0
9.0	38.7	23.0	11.2		

5) Dissolved Oxygen

Rinse water sampling bottle with sample water 3 times before beginning procedure.

TEST PROCEDURE

PART 1 - COLLECTING THE WATER SAMPLE



TEST PROCEDURE

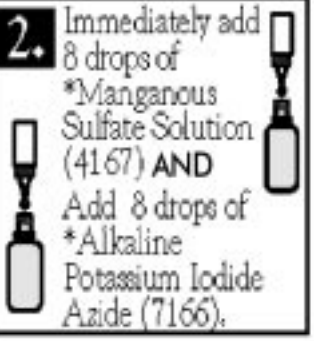
PART 2 - ADDING THE REAGENTS

NOTE:

Be careful not to introduce air into the sample while adding the reagents.

1. Remove the cap from the bottle.

2. Immediately add 8 drops of *Manganous Sulfate Solution (4167) **AND** Add 8 drops of *Alkaline Potassium Iodide Azide (7166).



3. Cap the bottle and mix by inverting several times. A precipitate will form.

4. Allow the precipitate to settle below the shoulder of the bottle.

5.

For Kit Code 7414:

Immediately use the 1.0 *g* spoon (0697) to add one level measure of *Sulfamic Acid Powder (6286).

6. Cap and gently invert the bottle to mix the contents until the precipitate and the reagent have totally dissolved. The solution will be clear yellow to orange if the sample contains dissolved oxygen.

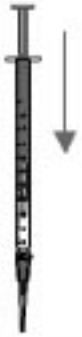
NOTE: At this point the sample has been "fixed" and contact between the sample and the atmosphere will not affect the test result. Samples may be held at this point and titrated later.

TEST PROCEDURE

PART 3 - THE TITRATION

1. Fill the titration tube (0608) to the 20 mL line with the fixed sample. Cap the tube.

2. Deptess plunget of the Titratot (0377).



3. Insert the Titratot into the plug in the top of the *Sodium Thiosulfate, 0.025N (4169) titrating solution.

4. Invert the bottle and slowly withdraw the plunget until the bottom of the plunger is opposite the zero mark on the scale.

NOTE:

If small air bubbles appear in the Titratot barrel, expel them by partially filling the barrel and pumping the titration solution back into the reagent container. Repeat until bubble disappears.

5. Turn the bottle upright and remove the Titratot.

NOTE:

If the sample is a very pale yellow, go to Step 9.

TEST PROCEDURE

PART 3 - CONTINUED

6. Insert the tip of the Titrator into the opening of the titration tube cap.

7. Slowly depress the plunger to dispense the titrating solution until the yellow-brown color changes to a very pale yellow. Gently swirl the tube during the titration to mix the contents.

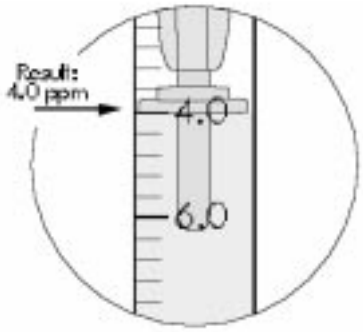
8. Carefully remove the Titrator and cap. Do not to disturb the Titrator plunger.

9. Add 8 drops of Starch Indicator Solution (4170WT). The sample should turn blue.

10. Cap the titration tube. Insert the tip of the Titrator into the opening of the titration tube cap.

11. Continue titrating until the blue color disappears and the solution becomes colorless.

12. Record the test result where the titrator tip meets the scale. Record as ppm Dissolved Oxygen. Each minor division on the Titrator scale equals 0.2 ppm.



TEST PROCEDURE

PART 3 - CONTINUED

NOTE:

If the plunger tip reaches the bottom line on the scale (10 ppm) before the endpoint color change occurs, refill the Titrator and continue the titration. Include the value of the original amount of reagent dispensed (10 ppm) when recording the test result.

NOTE:

When testing is complete, discard titrating solution in Titrator. Rinse Titrator and titration tube thoroughly. DO NOT remove plunger or adapter tip.

SHORT FORM INSTRUCTIONS

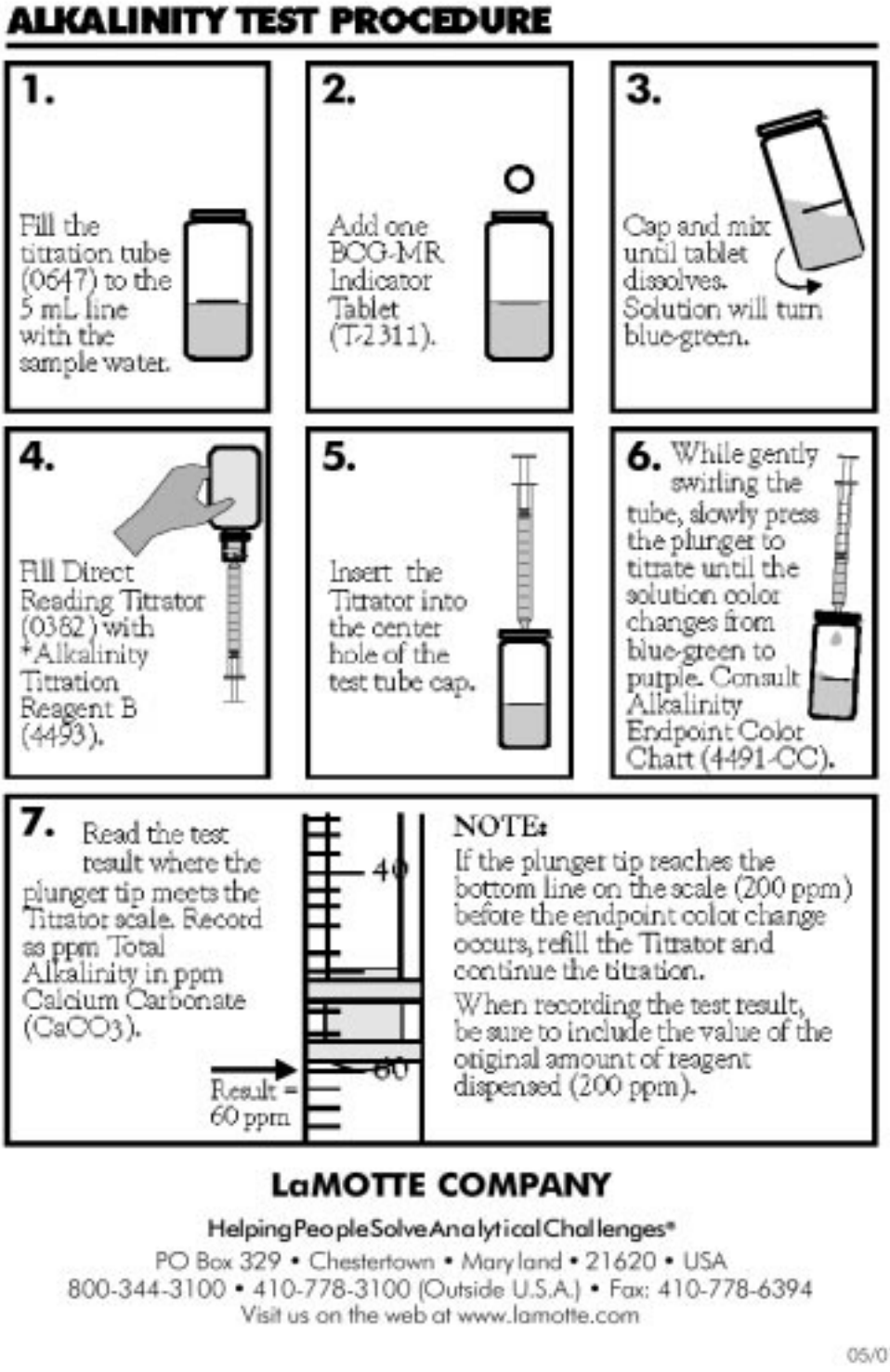
Read all instructions before performing test. Use this guide as a quick reference.

1. Fill Water Sampling Bottle (0688-DO).
2. Add 8 drops of *Manganous Sulfate Solution (4167).
3. Add 8 drops of *Alkaline Potassium Iodide Azide (7166).
4. Cap and mix.
5. Allow precipitate to settle.
6. Use the 1.0 g spoon to add *Sulfamic Acid Powder (6286) or add 8 drops of Sulfuric Acid, 1:1 (6141WT).
7. Cap and mix until reagent and precipitate dissolve.
8. Fill test tube (0698) to the 20 mL line.
9. Fill Titrator with *Sodium Thiosulfate, 0.025N (4169).
10. Titrate until sample color is pale yellow.
11. Add 8 drops of Starch Indicator (4170WT).
12. Continue titration until blue color just disappears and solution is colorless.
13. Read result in ppm Dissolved Oxygen.

Discard all waste into waste beaker, rinse bottles three times with distilled water, emptying into waste beaker.

6) Alkalinity

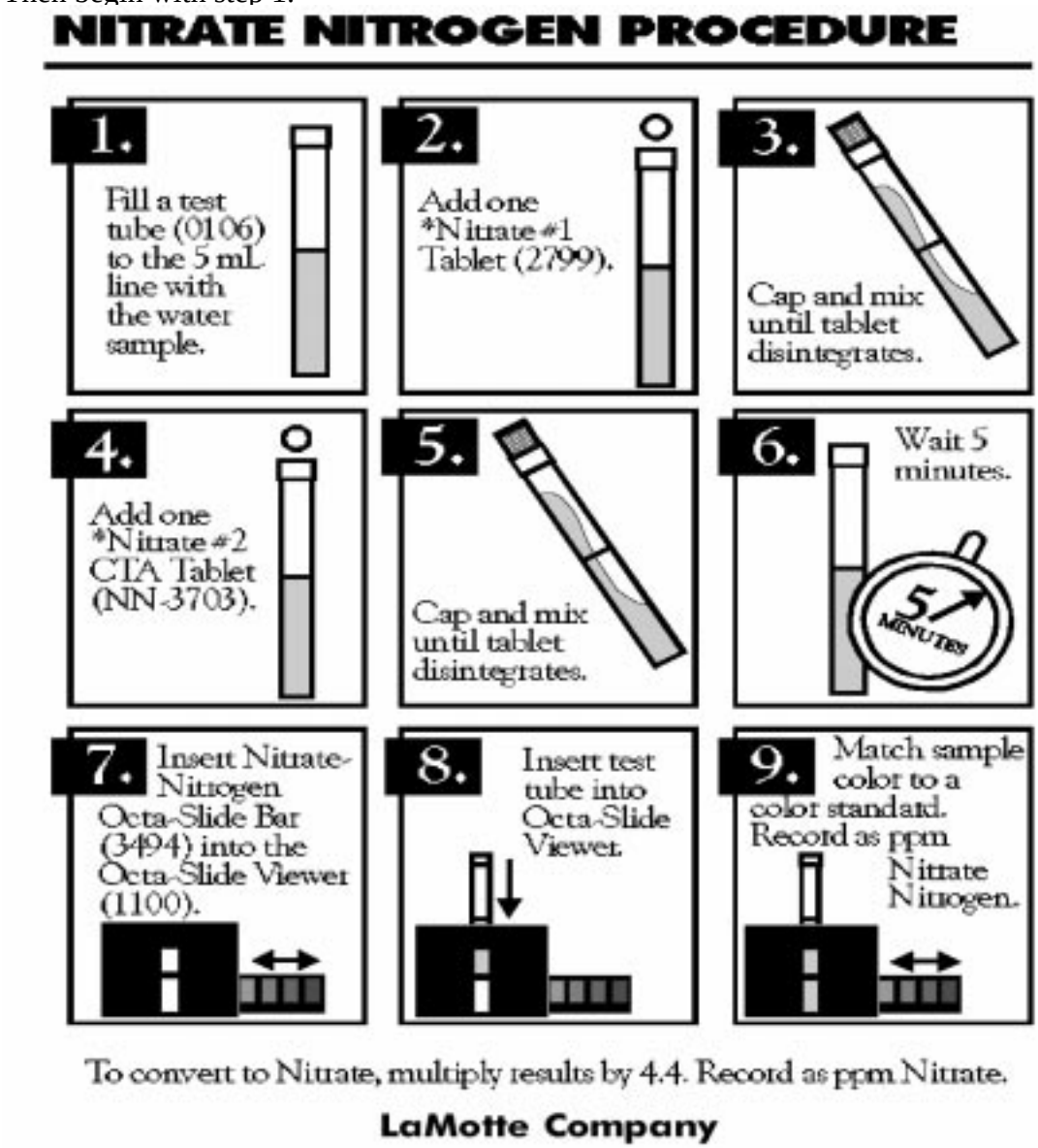
Rinse titration tube 3 times with sample water before starting procedure.

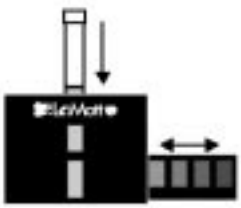


Empty titration tube into waste jar. Rinse titration tube with distilled water 3 times, dumping rinse water into waste jar after each rinse.

7) Nitrate-Nitrogen

Prior to adding any reagents, rinse test tube three times with sample water. Then begin with step 1.





The Octa-Slide Viewer should be held so non-direct light enters through the back of the comparator. With sample tube inserted at top, slide the Octa-Slide bar through the viewer and match with color standard.

After sampling, pour test tube contents into waste jar and rinse test tube 3 times with distilled water. Dump rinsate into waste jar as well.

8) Orthophosphate

Measuring Hints and General Test Information

• Rinse all viewing tubes **3 times** with the sample water **before testing**. and **3 times** with distilled water **after testing.**

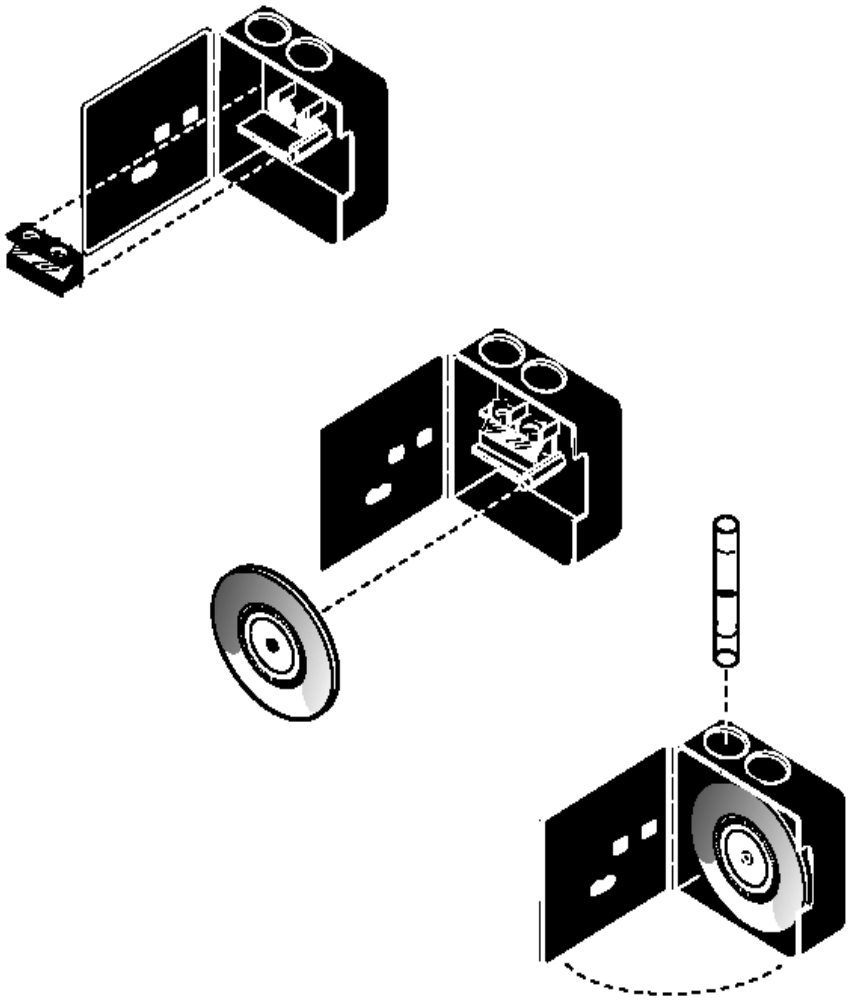
• To open PermaChem® Powder Pillows:

1. Tap the bottom of the pillow on a hard surface.
2. Tear open the pillow along the dashed line.
3. Open the pillow and form a spout by squeezing the side edges.
4. Pour the contents into the sample.

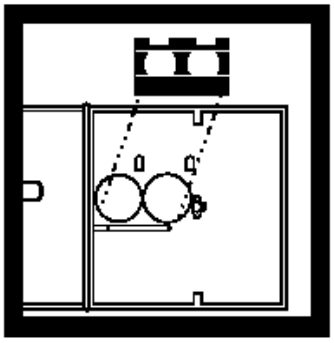
• Accuracy is not affected by undissolved powder.

• Start with the Mid-Range test. If the color is too light to make a measurement, try the Low Range test. If the color is too dark, go to the High Range test. Most likely, you will only need to perform the Mid-Range test.

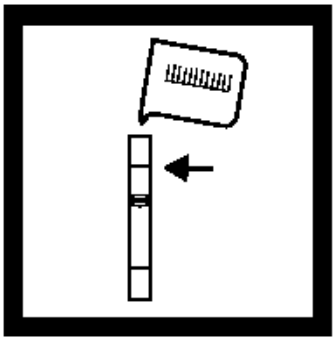
♦ Figure 1
Using the Long Path Viewing Adapter in the Color Comparator



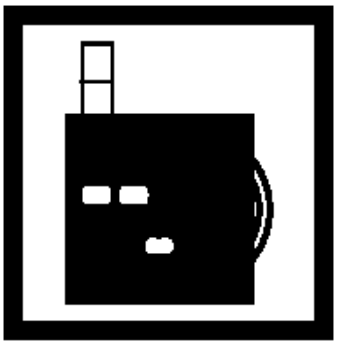
Phosphate Low-Range Test (0–1 mg/L)



1. Insert the Long Path Viewing Adapter into the color comparator.



2. Fill a viewing tube to the top line, which underlines “No. 1730,” with sample water. This is the blank.



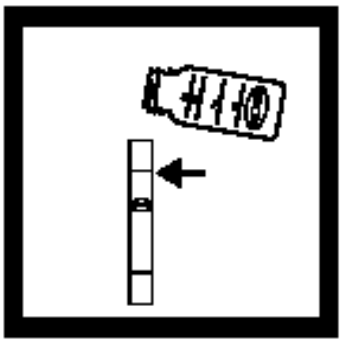
3. Place this tube in the top left opening of the color comparator.

4. Fill the square mixing bottle to the 20-mL mark with sample water.

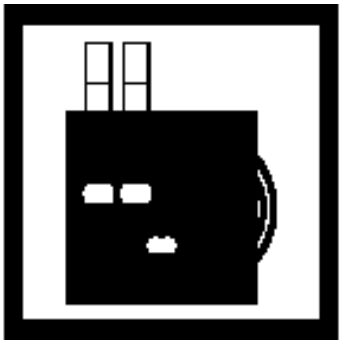
Low Range Cont'd

5. Add the contents of one PhosVer® 3 Phosphate Reagent Powder Pillow to the bottle.

6. Swirl to mix. Wait eight minutes for full color development. If phosphate is present, a blue-violet color develops. Complete the test and read the result within 10 minutes of the addition of the powder.

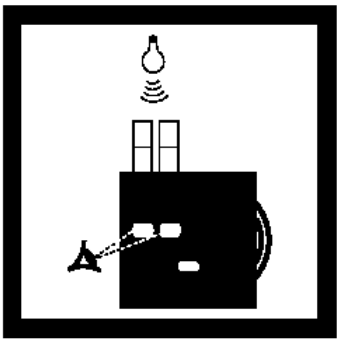


7. Fill another viewing tube to the top line, which underlines "No. 1730," with the prepared sample.

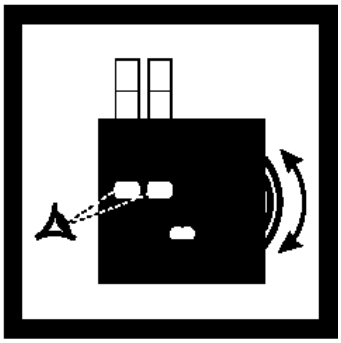


8. Place the second tube in the top right opening of the color comparator.

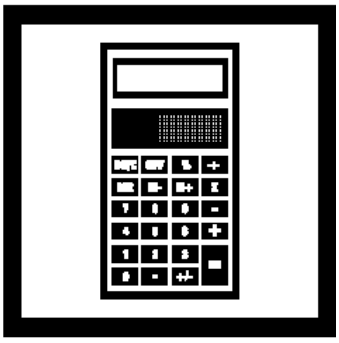
Low Range Cont'd



9. Hold the comparator with the tube tops pointing toward a light source such as the sky, a window or a lamp. Look through the openings in the front of the comparator. Be careful to not spill samples from unstoppered tubes.



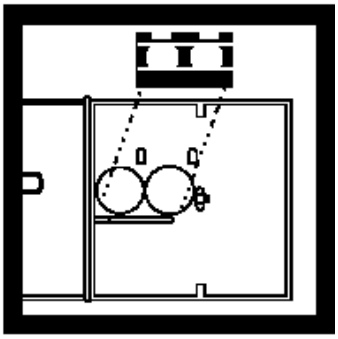
10. Rotate the color disc until the color matches in the two openings.



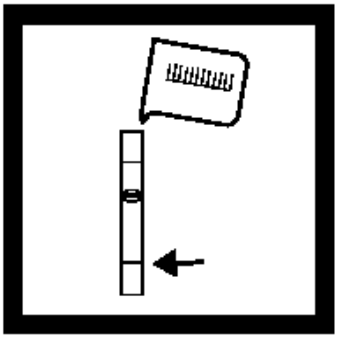
11. Divide by 50 the reading in the scale window to obtain the mg/L orthophosphate. To obtain mg/L orthophosphate-P, divide the mg/L orthophosphate value by 3.

12. Dump waste into waste jar, rinse tubes 3 times with distilled water and dump into waste jar.

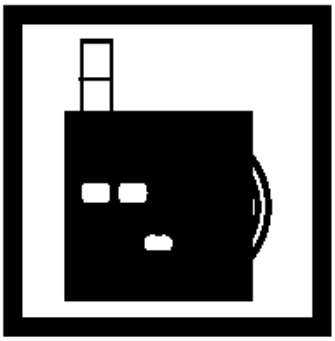
Phosphate Mid-Range (0-5 mg/L)



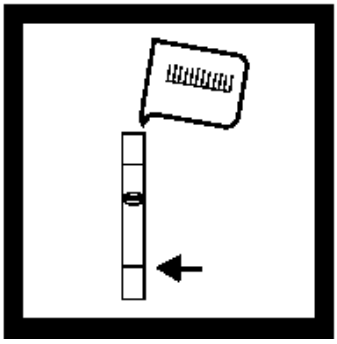
1. If the color comparator has the Long Path Viewing Adapter in place, remove it.



2. Fill a viewing tube to the first (5-mL) line with sample water. This is the blank.



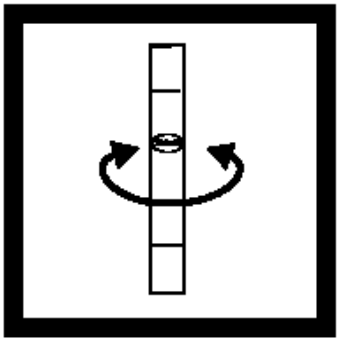
3. Place this tube in the top left opening of the color comparator.



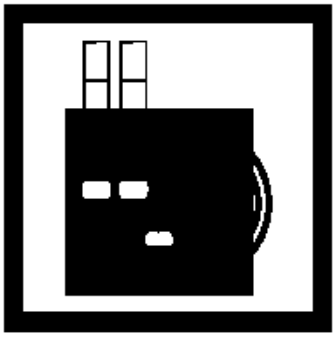
4. Fill another viewing tube to the first (5-mL) line with sample water.

Mid Range Cont'd

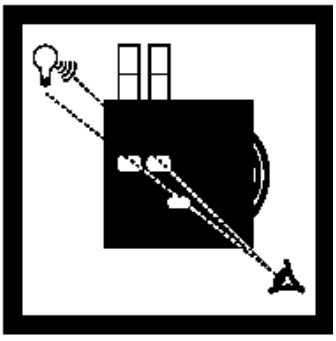
5. Add the contents of one PhosVer 3 Phosphate Reagent Powder Pillow to the second tube.



6. Swirl to mix. Wait at least one minute for full color development. If phosphate is present, a blue-violet color develops. Complete the test and read the result within five minutes of the addition of the powder.

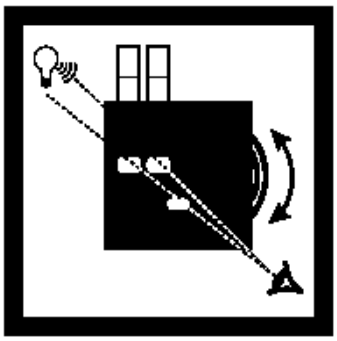


7. Place the second tube in the top right opening of the color comparator.

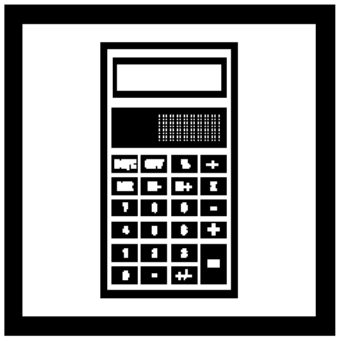


8. Hold comparator up to a light source such as the sky, a window or a lamp. Look through the openings in front.

Mid Range Cont'd



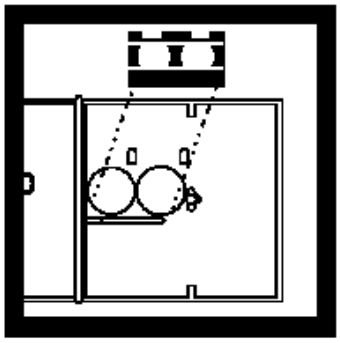
9. Rotate the color disc until the color matches in the two openings.



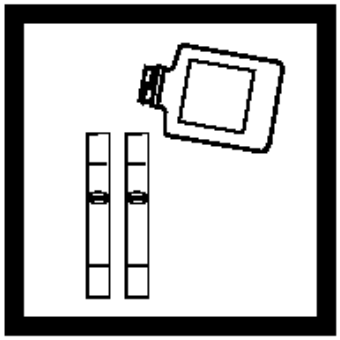
10. Divide by 10 the reading in the scale window to obtain themg/L orthophosphate. To obtain mg/L orthophosphate-P, divide the mg/L orthophosphate value by 3.

11. Dump waste into waste jar, rinse tubes with distilled water three times and dump rinse water into waste jar.

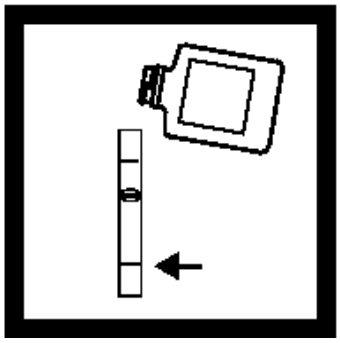
Phosphate High Range (0-50 mg/L)



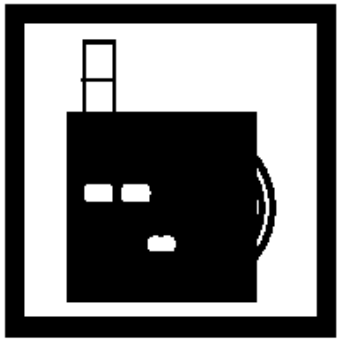
1. If the color comparator has the Long Path Viewing Adapter in place, remove it



2. Rinse two viewing tubes with distilled water.



3. Fill a viewing tube to the first (5-mL) line with distilled

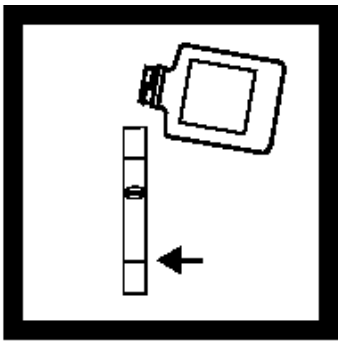


4. Place this tube in the top left opening of the color comparator.

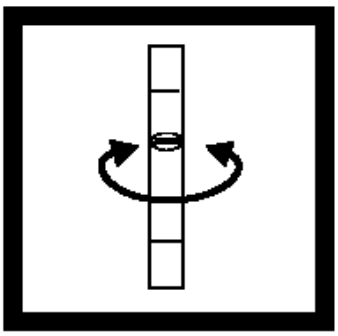
High Range Cont'd

5. Rinse the plastic dropper several times with the sample water.

6. Fill the dropper to the first (0.5-mL) mark with the sample water. Put this water in the second viewing tube.

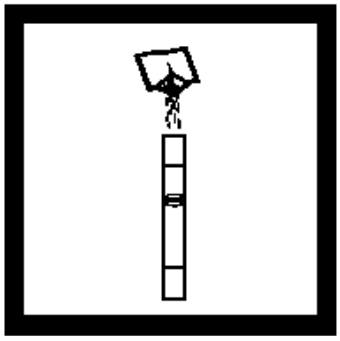


7. Add distilled water to the first (5-mL) line on the second tube.

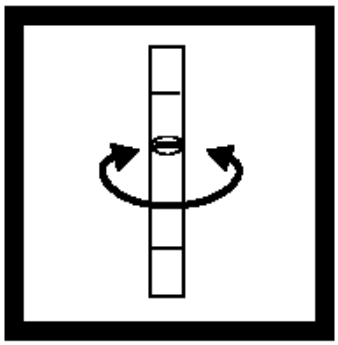


8. Swirl to mix.

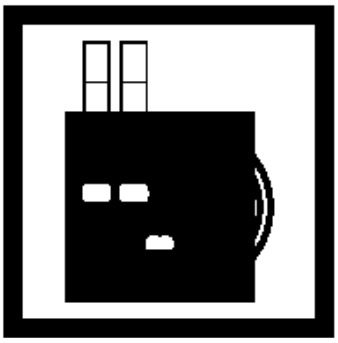
High Range Cont'd



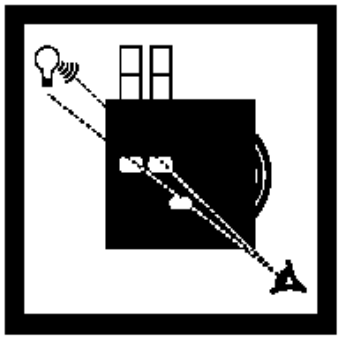
9. Add the contents of one PhosVer 3 Phosphate Reagent Powder Pillow to the second tube.



10. Swirl to mix. Wait at least one minute for full color development. If phosphate is present, a blue-violet color develops. Complete the test and read the result within five minutes of the addition of the powder.

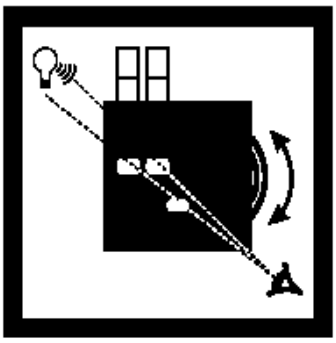


11. Place the second tube in the top right opening of the color comparator.

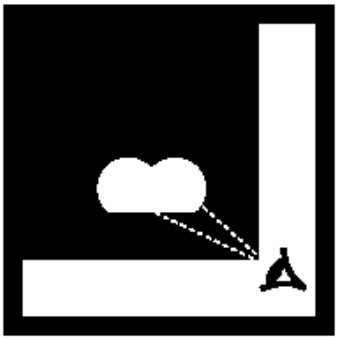


12. Hold comparator up to a light source such as the sky, a window or a lamp. Look through the openings in front.

High Range Cont'd



13. Rotate the color disc until the color matches in the two openings.



14. Read the mg/L orthophosphate in the scale window. To obtain mg/L orthophosphate-P, divide the mg/L orthophosphate value by 3.

15. Dump waste into waste beaker. Rinse test tubes 3 times with distilled water, dumping rinse water into waste beaker.

9) Stream Flow

Time constraints may prohibit you from monitoring stream flow each time you go out to sample. We recommend that flow be monitored at least 2 times a year, depending on your investigative goals. If the stream is really fast, it may be unsafe to cross it. Do not attempt to do this test under such conditions.

Materials

Tape Measure
Yard stick or sediment stick
Tennis ball (or other brightly colored object that floats just below the water surface)
Watch with a second hand or a stopwatch
4 stakes
string

Procedure

1. Select a straight stream segment.
2. Stake a string across the stream near the surface of the water. Use the tape measure to run a second string across the stream 20 feet downstream of the first string.
3. Measure the width of the stream.
4. At three points along the upstream string (approx 1/4 distance across, 1/2 distance across, and 3/4 distance across), measure the depth of the stream.
5. At each of the three points, measure travel time down to the next string as follows:
6. Drop the float in the stream just above the upstream string.
7. Record the time it takes for the float to travel from the first string to the second string.

Calculate the flow using the data sheet.

Troubleshooting

After you run a chemical test, you may see values that you did not expect. Be sure to run each test twice, and if you get two very different measurements, run the test a third time. If you suspect that the values you have measured are incorrect, you can check your equipment by running the test using distilled water instead of stream water. You should find that nitrate and orthophosphate have concentrations of zero. pH should be between 5.5-6.0 (slightly above or below is fine), alkalinity should be approximately 4 ppm, and dissolved oxygen will be dependant on temperature according to the table shown in Appendix A.

Prairie Rivers Network will retrain any volunteer who suspects their ability to sample is faulty. Also, if a stream continues to have abnormal chemical levels, Prairie Rivers Network will sample the stream using more sophisticated equipment and determine the problem and what action to take.

Data sheets and submittal

Data is recorded on the data sheet provided, found in Appendix C. The data sheet must be completed at the site and time of testing. The names of all volunteers participating in the sampling are recorded on the data sheet with contact numbers for at least one certified individual. It is suggested that volunteers make a copy of the completed data sheet to keep with their own records before turning it in.

After the data has been entered into the online database, send a copy of the data sheet to Prairie Rivers Network (809 S. Fifth St., Champaign, IL 61820). Prairie Rivers Network will store this copy in its offices.

Sources of Information

Many concepts and tests included in this program are adapted from other monitoring programs including Alabama Water Watch, Missouri Stream Teams, and the Delaware Stream Watch. Several USEPA documents were used as well, including *Volunteer Stream Monitoring: A Methods Manual*.