

Chester Tester Monitoring Program

Standard Operating Procedures

Introduction

This Standard Operating Procedure (SOP) is designed to help guide and sustain a high quality water monitoring program. The procedures are utilized by the program manager and volunteers to assure that each individual or sampling crew follow the same protocols. Quality assurance in a monitoring program is essential for providing representative and accurate data for a water body, which is vital for the continuation of a monitoring program.

The SOP's are listed by section, with added instructions for safety and tips on keeping up proper maintenance of testing equipment. All volunteers are to follow these guidelines and procedures to ensure reliable, high quality data. The program manager and trainers are to use the SOP's as a tool for training new volunteers during an initial training class and during coordinated quarterly training sessions.

1.0 Training and Quality Assurance

1.1. Training

Chester Tester volunteers will receive initial training provided by the Chester River Association Watershed Coordinator, in association with LaMotte Company, Chestertown, Md. Training will include the following:

- Program history and objectives
- Review of Chester Tester Monitoring Program Standard Operating Procedures
- Familiarization with all sampling equipment, reagents, associated reports, recording and reporting data
- Practical experience through laboratory analysis of control samples
- Field experience with a mentor; collecting samples, conducting tests, recording results and reporting data

1.2. Quality Assurance

Quality Assurance training is conducted on a quarterly basis for all Chester Tester Monitoring Program volunteers. Volunteers are expected to attend at least 3 of the 4 annual training sessions. Training occurs in a controlled lab setting, by representatives from LaMotte Company and/or Watershed Coordinator. Control samples for training purposes, shall be provided by LaMotte Company, (See Appendix D for the Quality Assurance Standards Log). Test procedures are closely monitored as well as inspection of all equipment and replacement of chemical reagents as needed, (see section 4.2, Test Kit Reagents). Record(s) of training are maintained at Chester River Association.

FIELD DUPLICATES

During the calendar year, each Chester Tester volunteer collects samples 2 times per month, a total of 24 samples for analysis. The Watershed Coordinator and/or designee from the Science & Technology Committee will visit each site while being tested to observe sample collection, analysis, and data recording procedures. Field duplicates will be collected at the same time as environmental samples and tests will be randomly analyzed along with the associated environmental samples. If the relative percent difference (RPD) of field duplicate results in greater than 25%, both samples will be reanalyzed.

Chester Tester Monitoring Program

Standard Operating Procedures

2.0 Safety

Safety is of the utmost importance to the Chester River Association. There are hazards in both the field and the lab, so please use caution. If at anytime a volunteer feels that unsafe conditions exist, they are advised to terminate that activity immediately. During inclement weather conditions, the sampling site may become a hazard due to; wet and/or slippery conditions, high winds, or torrential water that can be dangerous to the individuals sampling. It is recommended that more than one person be on site in case of an emergency. If collecting samples alone, be sure to let someone know where you will be, and anticipated time of return.

The tests that are performed on water samples require the use of reagents that may be hazardous if handled incorrectly. Follow basic handling procedures such as washing hands before and after use, using appropriate cleaning materials for spills, disposing of wastes properly, and supervising young children and pets that may come in close contact with reagents or their containers. If any volunteer feels uncomfortable in handling reagents, refer to the Material Safety Data Sheets (MSDS) in Appendix F or online at www.lamotte.com. MSDS data sheets provide chemical handling, waste and emergency procedures and instructions.

3.0 Testing Period and Time Frame

The time frame for collecting water samples and performing tests is important for maintaining a quality monitoring program. When samples are collected from all Chester Tester sites during the same time period, it allows for the comparability of data across the watershed by reducing temporal variability. Schedules are also crucial in maintaining coordination between the program manager and volunteers.

3.1. Non-Tidal and Tidal Sampling Times

At non-tidal monitoring sites, it is preferable to sample between 10:00 AM and 2:00 PM. This is the time period of greatest activity of aquatic species and when conditions need to be monitored.

Tidally influenced monitoring sites need to be sampled on the ebb tide, preferably two to three hours prior to low tide. The reason for sampling during the ebbing tide is that the water flowing in the stream channel has a higher potential of coming from upstream sources. This will allow for better accuracy and source detection during the analysis phase. (The preferred sampling time still remains between 10:00 AM and 2:00 PM when tidal influence allows).

Tidal influenced monitoring sites:

LC2 – Greys Inn Creek
MC1 – Radcliffe Creek
MC2 – Morgan Creek
CR1 – Three Bridges
CR2 – Old Mill Stream
UC7 – Red Lion Branch

3.2. Sample Period

CRA understands that volunteers are not paid employees and may have prior or more urgent commitments from time to time. As a result, CRA has established a testing window. The testing window is from Friday through Monday.

Chester Tester Monitoring Program

Standard Operating Procedures

Water quality sampling will occur twice a month for every month throughout the year, to provide adequate sample numbers for statistical validation. The first full weekend, that includes all four days of the testing window, and the third weekend are the designated sampling time periods that all samples must be taken. This will provide proper coordination and allow for comparisons to be made from site to site. Dissolved Oxygen (DO) will not be tested during the months of December, January or February. A testing calendar will be distributed each December for the upcoming calendar year, (Appendix B).

In the circumstance of a rain event, volunteers will decide which day they will sample. If rainfall has occurred in the past 24 hours or it is raining during sampling, note will be made in the comments portion of the Water Quality Data Sheet.

Should a volunteer not be able to conduct testing at their site, the Watershed Coordinator should be notified in advance to the testing date, to allow for alternate arrangements for sample collection at the site. (410) 810-7556 extension 302.

4.0 Field Sampling

The Chester Tester Monitoring program is divided into two types of activities: 1) field collection and 2) lab testing. This section will cover procedures that are necessary to provide accurate, high quality data that represents the body of water being sampled. Although the order of the activities can vary at the site, all procedures must be followed. Any changes in procedure need prior approval from the program manager and must be acknowledged in field notes.

There are some basic techniques for collecting water samples that are outlined in the following sections of this SOP. Training will be provided in an initial site visit with program manager or qualified trainers or volunteers. Volunteers may request further training at any time.

4.1. Sampling Kit Contents

4.1.1. Field Kit (yellow tool box)

- Dissolved oxygen sample collection chamber, orange cap, and weight (1054-DO)
- Calibrated line with clip (1064-G)
- Plastic sample bottle (for reagent tests)
- Two glass sample bottles (for D.O. test) (0688-G)
- D.O. fixing chemicals
 - ✓ Manganous Sulfate (white cap, pink liquid)(4167)
 - ✓ Alkaline Potassium Iodide Azide (white cap, blue wrapper, clear colorless liquid)(7166)
 - ✓ Sulfuric Acid (red cap, clear colorless liquid)(6141WT)
- Armored thermometer (1066)

4.1.2. SMART or SMART2 colorimeter lab box

- SMART2 Colorimeter and power cord
- NO3 test cube (3649-SC)
 - ✓ Mixed Acid (Clear, pale green liquid)(V-6278)
 - ✓ Nitrate Reducing Acid (Pale gray, free-flowing powder)(V-6279)

Chester Tester Monitoring Program

Standard Operating Procedures

- ✓ 0.1 0 gm plastic measuring spoon
- PO4 test cube (3653-SC)
 - ✓ Phosphate Acid Reagent (Clear colorless liquid)(V-6282)
 - ✓ Phosphate Reducing Agent (White, free-flowing powder)(V-6283)
 - ✓ 0.1 0 gm plastic measuring spoon
- AM test cube (3642-SC)
 - ✓ Ammonia Nitrogen Reagent #1 (Clear, colorless liquid)(V-4797)
 - ✓ Ammonia Nitrogen Reagent #2 (Clear, pale yellow liquid, w/ possible dark specks at the bottom of bottle)(V-4798)
- 6 glass Colorimeter test vials w/10ml mark(0967 or 0290)
- Yellow cap for colorimeter blank (sample) vial
- Turbidity blank vial for colorimeter with blue cap
- Glass test tube (0898) with markings for 5 ml and 10 ml.
- 50 ml graduated cylinder (for dilution of over range samples)
- D.O. Titration
 - ✓ Sodium Thiosulfate (4169)
 - ✓ Starch Indicator (Hazy, colorless to a hint of blue, liquid)(4170WT)
 - ✓ Titrator (looks like a syringe)(0377)
 - ✓ Titration Tube (25 ml – 0608)
- Phenol Red pH bottle with 0.5 ml dropper (V-2304)
- Other
 - ✓ Dilution Procedure
 - ✓ Bottle of distilled water or demineralized water
 - ✓ Bottle and test tube cleaning brush
 - ✓ Graduated cylinder (10ml)
 - ✓ D.O. titrating instructions
 - ✓ Laminated Field/lab instructions
 - ✓ Owner's manual and test procedures
 - ✓ Data Sheets
 - ✓ 1000 ml Plastic Bottle for Cadmium Waste
 - ✓ Lint free wipes

4.2. Test Kit Reagents

Reagents used for the Chester Tester Monitoring Program are provided by LaMotte Company, 802 Washington Ave., Chestertown, MD. 21620. Reagent containers are marked with shelf life expiration dates, and will be replaced as needed at the quarterly Quality Assurance training sessions. All reagents will be replaced annually, regardless of expiration date, and used reagents properly discarded. Each reagent should be visually checked before each use for contamination. Refer to Appendix E, Reagent Replacement Table for descriptions of reagents used. If reagents are needed between training sessions, they may be obtained by contacting the Watershed Coordinator at the Chester River Association office located at 100 North Cross St., Suite 1, Chestertown, Md. 21620, (410) 810 – 7556, extension 302.

4.3. General Field Sampling Method

1. Record basic site information on the data sheet prior to sampling (e.g., time and date).
2. Collect water sample from about 1 foot below the surface. Be careful not to disturb the bottom if in shallow water. Rinse your DO water sample bottle (0688-DO) out 3 times with the water to be tested or use the Dissolved Oxygen Sampler (1054). Discard rinses downstream or away from sample site.

Chester Tester Monitoring Program

Standard Operating Procedures

3. Suspend a dry thermometer (1066) in shade to record air temperature.
4. Collect and fix 2 distinct dissolved oxygen samples according to specific kit instructions.
5. Pour excess sample water from dissolved oxygen sampler (1054-DO) into plastic sample bottle.
6. Collect another sample if insufficient to fill plastic sample bottle.
7. Record air temperature; then place thermometer in dissolved oxygen sampler (1054) with sample water or the actual body of water to get water temperature.
8. Record all measurements.
9. Observe and record:
 - Tidal or non-tidal, if tidal then indicate ebb or flood
 - Water odor
 - Water color
 - Water surface
 - Weather Condition
12. Make any general observations: (Note any unusual things such as: moon phase, water level, animal activity, surface phenomena).
13. Look for aquatic life: (e.g. ducks, geese, sea nettles, crabs, minnows, sub-aquatic vegetation). Give numbers or estimates when possible.

4.4. Sample Collection

The data derived from the testing of water samples collected, will be used to quantify the health or potential levels of contamination due to loading of pollutants (e.g., nutrients), to the Chester River and its tributaries. Therefore, it is imperative that samples are collected following protocols to accurately represent the body of water being sampled. Prior thought has already been used in locating each monitoring site. Sites have been located at bridge crossings or areas that have access to the flowing portions of the stream. At each stream crossing, the water flowing past the sampling point is confined, allowing a representative sample from upstream areas to be collected. When locating the proper position or placement of the sampling container and during sample collection, follow these general rules:

- Safety comes first - if it looks unsafe, do not attempt collecting a sample.
- Look for a part of the stream that is flowing with a strong current.
- If the entire width of the stream is flowing at the same rate, then sample anywhere within that span of the stream.
- Generally, sample at 1 foot below the surface.
- Avoid sampling behind an obstruction in the water column.
- Avoid disturbance of the stream bed, which could lead to inaccurate readings.
- Avoid sampling in non-flowing pooled areas of the stream.
- Avoid disturbance of the area that you are standing on and depositing any materials that may influence results.

Once the sample is collected, immediately secure the lid to the container. If chemicals are needed to prepare the sample for transport or assure quality of results, add them at this time before collecting another sample.

Chester Tester Monitoring Program

Standard Operating Procedures

4.5. Sample Preparation for Transport

To acquire accurate readings for each water quality parameter, proper handling and preparation of the water sample is critical. The chemistry of water is primarily influenced by temperature. Temperature increases or decreases the reactions of chemical compounds that are commonly found in natural waters. Dissolved oxygen is a priority parameter and directly relates to changes in temperature. If sample temperature increases, the ability of the water to hold oxygen is reduced and invalid test results may occur. Dissolved Oxygen test samples should be “fixed” immediately after collection. Other parameters that are being tested, such as Ammonia-Nitrogen, require temperatures to remain cool and testing within two hours of collection. The proper method to maintain the quality of the sample is to keep the sample container on ice. This rule applies if:

- Multiple samples are to be collected at different locations.
- The transport time or holding time until sample is tested is greater than two hours.
- The weather or sample container environment is extremely warm.

Generally, all Chester Tester volunteers only have one site to test and as long as testing can commence within two hours of collecting sample, packaging on ice is not necessary. Store the water sample in field kit.

4.6. Specific Sampling Procedures

4.6.1. Collecting Sample With Dissolved Oxygen Sampler

This device is designed for use in the field and is a simplified water sampler. The sample is collected in a removable inner bottle which is overflowed 5 times to insure a representative sample. Samples may be taken at a controlled depth by using a calibrated line. Attaching a weight to the bottom or body of the sampling device insures rapid descent and minimizes the amount of drift due to currents. More weight should be attached to the sampling device in strong currents.

It is necessary to maintain a position directly over the water sampling body when lowering it so that it remains in an upright position. This permits the displacement of all of the air in the sampler so that it will fill completely. As it fills, bubbles of air displaced from the sampler will be observed downstream.

1. Remove the orange plastic center plug with inlet tubing attached.
2. Insert a clean glass collecting bottle (0688-DO), with the cap removed, into the inner chamber of the cylinder.
3. Replace the plastic center plug and make sure the inlet tubing is in the collecting bottle.
4. Attach a weight to the bottom bridle of the sampler unless sampler is otherwise weighted.
5. Attach the snap clamp on the calibrated line to the bridle on top of the sampler.
6. Quickly lower the water sampler to the desired depth and leave until full. This can be determined when the bubbles from the displaced air in the sampler cease to appear. This usually takes from 3-5 minutes.
7. Carefully retrieve the water sampler.
8. Remove the plastic center plug to expose the collecting bottle in the inner chamber. Carefully cap the collecting bottle with the polyseal (v-shaped plastic insert) cap, and then remove the bottle from the sampler.
9. If a dissolved oxygen test is to be performed on this sample, proceed immediately to “**Fixing**” **Dissolved Oxygen Sample**, section 4.5.3.

Chester Tester Monitoring Program

Standard Operating Procedures

10. If tests other than dissolved oxygen are to be performed on the sample, pour excess water from the collection chamber into a plastic sample bottle and cap securely (if more than one site is monitored make sure bottle is properly marked). Make sure that there is no air space in the sample bottle.

4.6.2. Collecting Sample Without Dissolved Oxygen Sampler

1. Thoroughly rinse the DO water sampling bottle (0688-DO) with sample water 3 times (or use DO sample collection chamber, see section 3.4.1)
2. Fill the sample bottle by gently easing into the water, holding the bottle vertically under the water, facing the direction of the water flow.
3. Tap the sides of the submerged bottle to dislodge any air bubbles clinging to the inside. Carefully cap the bottle with the polyseal (v-shaped plastic insert) cap, and then remove from the water.
4. Once a satisfactory sample has been collected, proceed immediately to **“Fixing” Dissolved Oxygen Sample**, section 3.4.3.

4.6.3. “Fixing” Dissolved Oxygen Sample

1. It is important not to introduce air into the sample while adding the reagents. Drop the reagents into the sample, holding reagent bottles vertically. When reagents are added to the sample, they will sink to the bottom and displace water from the top of the bottle.
2. Add 8 drops of Manganous Sulfate Solution (4167) and 8 drops of Alkaline Potassium Iodide Azide (7166).
3. Cap tightly and mix by inverting several times. A precipitate will form. Allow the precipitate to settle below the shoulder of the bottle before proceeding. Note – the inverted v shaped plastic insert in the cap will displace water and create an air tight seal to prevent oxygen from entering or leaving the sample.
4. Add 8 drops of Sulfuric Acid, 1:1 (6141WT).
5. Cap tightly and mix until the reagent and the precipitate have dissolved. A clear-yellow to brown-orange color will develop, depending on the oxygen content of the sample.
6. If precipitates (solids) remain after mixing, add 2 – 5 additional drops of Sulfuric Acid and mix until the precipitate has dissolved.

Following the completion of Step 5, contact between the water sample and the atmosphere will not affect the test result. Once the sample has been "fixed" in this manner, it is not necessary to perform the actual test procedure immediately. Thus, several samples can be collected and "fixed" in the field, and then carried back to a testing station or laboratory where the titration procedure is to be performed within 2 hours.

4.6.4. Temperature Readings

1. Measure air temperature in an area that is out of direct sunlight or in the vicinity of any external heat.
2. Allow 10 minutes before reading thermometer.
3. Measure water temperature by placing the thermometer either in the dissolved oxygen sampler chamber or in the water source where the sample was collected. (Only use the sampler chamber after all water samples to be tested have been properly packaged).
4. Allow 10 minutes before reading temperature.
5. Record data on site data sheet.

Chester Tester Monitoring Program

Standard Operating Procedures

5.0 Lab Testing Procedures

5.1. General Lab Testing Procedure

The following are generally accepted lab testing procedures:

1. Make sure all glass wear is clean and dry from prior testing cycles.
2. Make sure work surface is clean and free of clutter.
3. Mix sample in collection bottle by inverting 2 times before dispensing into colorimeter test tube.
4. Each test requires a BLANK to be scanned before inserting the prepared sample for comparison. If monitoring only one site: pour sample water into one colorimeter test tube and use as the BLANK for each test, (except for turbidity). Some kits will have a test tube with a yellow cap; this is used to identify the blank test tube containing the sample water. Distilled water is used for the blank when conducting the Turbidity test. Some kits have a test tube with a blue top containing distilled water and should be as the turbidity blank only.
5. The testing order should be:
 - Nitrate-Nitrogen
 - Ammonia-Nitrogen
 - Phosphate
 - pH
 - Turbidity
6. Follow instructions for each test. NOTE: some tests have a required development time, allowing time for other tests to be started and completed. Do not start other tests unless you are comfortable in your lab techniques and are familiar with the testing procedures.
7. Record all data on the data sheet filled out during the field sampling process.
8. Dispose of chemicals properly. Nitrate-Nitrogen test produces a cadmium waste that should be stored in a sealable container and labeled "Cadmium Waste". All other waste can be poured down the sink with ample amounts of water. NOTE: You should not pour any waste material down the drain if you have a nutrient reducing septic system.
9. After all waste is properly contained, wash all equipment, glassware and sample bottles with tap water and with distilled or deionized water using the "Rule of Three" method. (If detergent is used, use only a small amount that does not contain phosphates. Do not use a dishwasher to clean glassware or sample bottles)

5.2. Basic Lab Techniques

The lab testing procedures that are outlined in this document and in the Colorimeter Specific Test Procedures, Appendix A are to be followed with no deviations. Collecting quality data requires careful practice of good lab techniques and following all specific directions when mixing reagents. The directions for each test have been developed by LaMotte and guarantee accurate results. A laminated Water Testing Procedures card book has been developed along with a sequence on each Colorimeter. Sequence 1 is used for Chester Testers and is pre-set for all tests that will be analyzed. Please use caution and double check that the test number on the sequence list is the same on the laminated cards.

The SMART Colorimeters utilize a light wavelength technology that detects minute color changes in a sample after specific reagents are combined and allowed to react. Using glass test tubes, the colorimeter selects a filter that will analyze color development and targets a beam of light through the water sample matrix. Because of this process, it is extremely important that all glassware is free of water drops, finger smudges and solid residue on the inside and

Chester Tester Monitoring Program

Standard Operating Procedures

outside surfaces of the glass. If at any time the glassware becomes worn and excessive scratches show, contact the program manager and have the equipment replaced.

5.2.1. The Rule of Three

The rule of three is simply a process that one should use in the field, in the lab, during clean-up, and when preparing a sample for testing. In the field, always rinse out the collection container with the water to be sampled at least three times by pouring just a small amount of water in the container and shaking, then dumping the water away from its source. The rule applies in the lab prior to testing. During clean-up, use the rule of three for washing and for rinsing.

5.2.2. Limit Contamination

Good lab practices limit contamination of the testing equipment and the water sample that you are analyzing. Contaminated test reagents can not be used for the next test period and will jeopardize all data and quality assurance measures. Follow these basic rules:

1. Keep reagent dispensing equipment clean (e.g., spoons, syringes, graduated cylinders and test tubes).
2. Make sure spoons and droppers only come into contact with the appropriate reagents.
3. Keep track of test tubes when working with multiple sites.
4. Keep lab work area clean.
5. Make sure selected tests are measured accurately and with the appropriate reagents.

5.2.3. Approved Analytical Methods

Clean glassware is a must for accurate results. Thoroughly rinse test tubes before and after each use. Caps and stoppers should also be cleaned after each use.

- When adding sample to calibrated test tubes, be sure tube is filled to the appropriate mark. The bottom of the liquid (meniscus) should be level with the desired mark (See Figure 1).
- When dispensing reagents from bottles fitted with dropper plug and cap, be sure to hold bottle vertically and gently squeeze to dispense the appropriate number of uniform drops (See Figure 2).
- For those reagents to be added with the enclosed screw cap pipet assemblies, remove polyseal cap on bottle and replace with the screw cap pipet.
- Note: We recommend placing the polyseal caps back on the reagent bottles for longer periods of storage. Be sure that both pipet assemblies and polyseal caps are thoroughly clean and dry before placing on the bottles to avoid contamination.
- When dispensing reagents from pipets, hold pipet vertically to assure uniform drop size (Figure 3).
- To fill pipets, squeeze rubber bulb and immerse tip into reagent. Release bulb slowly to fill (Figure 4).
- To accurately dispense powdered reagents with spoon, tap spoon on vial to remove excess reagent (Figure 5).

Chester Tester Monitoring Program

Standard Operating Procedures



Figure 1

Figure 2

Figure 3

Figure 4

Figure 5

5.3. Specific Test Procedures

5.3.1. Dissolved Oxygen Titration

The Titration method for analyzing dissolved oxygen content utilizes a chemical reaction between Sodium Thiosulfate and the prepared, or "fixed", dissolved oxygen sample. The addition of Sodium Thiosulfate in small amounts chemically reacts with the fixed sample and results in a colorless mixture. The amount of dissolved oxygen in the water sample relates to the amount of Sodium Thiosulfate added. To determine the exact amount, a starch indicator is used to highlight the moment when all possible reactions are complete, and the mixture turns colorless. Each kit is outfitted with instructions that depict the "fixing" and titration procedures.

Titration Procedure

1. Fill the titration tube (0299) to the 20 mL line with the "fixed" sample and cap.
2. Fill the Direct Reading Titrator (0377) with Sodium Thiosulfate, 0.025N (4169). Make sure no air bubbles are present in the syringe.
3. Insert the Titrator into the center hole of the titration tube cap. While gently swirling the tube, slowly press the plunger to titrate until the yellow-brown color is reduced to a very faint yellow.
NOTE: If the color of the "fixed" sample is already a very faint yellow, skip to Step 4.
4. Carefully remove the Titrator and cap and add 8 drops of Starch Indicator Solution (4170WT). Sample should turn blue. (Be careful not to disturb the Titrator plunger, as the titration begun in Step 3 will be continued in Step 5).
5. Replace the cap and Titrator. Continue titrating until the blue color just disappears. Read the test result directly from the scale on the side of the barrel, where the large ring on the Titrator meets the Titrator barrel.
6. Record as ppm dissolved oxygen.
7. Each minor division on the Titrator scale equals 0.2 ppm.
8. If the plunger tip reaches the bottom line on the Titrator scale (10 ppm) before the endpoint color change occurs, refill the Titrator and continue the titration. Make sure to stop at exactly 10 before refilling. When recording the test result, be sure to include the value of the original amount of reagent dispensed (10 ppm).
9. The Sodium Thiosulfate titrate will be replaced every 6 months to reduce inaccuracy due to contamination.

Chester Tester Monitoring Program

Standard Operating Procedures

5.3.2. Colorimeter Test Procedures

The Colorimeter Test Procedures for each parameter that Chester Tester Volunteers are testing can be found in Appendix A (SMART Colorimeter) and Appendix B (SMART2 Colorimeter) of this SOP. A laminated set of these same instructions is provided with each field test kit. The following tests will be conducted using the SMART Colorimeter or SMART2 Colorimeter, test sequence #1.

- Ammonia-Nitrogen (High Range); Code 3642-SC; Range 0 to 3.0ppm
- Nitrate-Nitrogen; Code 3649-SC; Range 0.00 to 3.00 ppm
- pH (Phenol Red Method); Code V-2304-H; Range 6.6 to 8.4
- Phosphate (Low Range); Code 3653-SC; Range 0.00 to 3.00 ppm
- Turbidity; Range 0 to 400 FTU
- Dilution Procedures for Over Range test results

6.0 Data Recording

6.1. Field Reporting

Each Chester Tester Volunteer should complete a Water Quality Data Sheet (Appendix C) for each sample collected and analyzed. The Chester Tester volunteer will maintain the original Water Quality Data Sheet, and a copy and/or electronic record of the information will be forwarded to the Watershed Coordinator at completion of the test or on a Monthly basis. A spreadsheet can be used to forward the data, however, must contain all information from the Water Quality Data Sheet. If the volunteer does not have access to e-mail or a computer, arrangements can be made with the program manager for drop-off, relay or mailing of the data sheet.

6.2. Review, Verification and Data Entry

All data reports submitted will initially be reviewed by the Primary Field Sampler. Test data reported with results of greater than +/- 45% of the average of targeted metric thresholds will be reviewed with the Environmental Scientist and volunteer who conducted collection/analysis, for procedural or data transcription error, or other explainable environmental influences.

Only data, which have acceptable deviations explained will be entered in the Chester River Association Bio-Monitoring Database for further reporting, review and used to characterize the severity of pollution for the monitored tributary. Records will be maintained for a period of at least 7 years.

Chester Tester Monitoring Program

Standard Operating Procedures

7.0 References

Campbell, G and Wildberger, S. 2001. The Monitor's Handbook: A Reference Guide for Natural Water Monitoring. LaMotte Company, Chestertown, MD.

LaMotte Company (LC-test). 2007. SMART2 Colorimeter Test Instructions, v.2.3 • 1/07 1919-test. Online. <http://www.lamotte.com/pages/common/pdf/instruct/1919test.pdf>

LaMotte Company (LC-man). 2007. SMART2 Colorimeter Operators Manual, V.2.3 • 1/07 1919-MN Online. <http://www.lamotte.com/pages/common/pdf/manuals/1919-mn.pdf>

LaMotte Company (LC-DO). 2007. Dissolved Oxygen Test Kit: Instruction Manual, Code 5860-01. Online. <http://www.lamotte.com/pages/common/pdf/instruct/7414.pdf>

LaMotte Company (LC-Sampler). 2010. Water Sampling Bottle for Dissolved Oxygen Code 1054-DO. Online. <http://lamotte.com/images/pdfs/instructions/1054-do.pdf>

8.0 Attachments:

Appendix A	SMART Colorimeter Specific Test Procedures
Appendix B	SMART2 Colorimeter Specific Test Procedures
Appendix C	Water Quality Test Data Sheet
Appendix D	Quality Assurance Standards Log
Appendix E	Reagent Replacement Table
Appendix F	Reagent MSDS Information
Appendix G	2011 Chester Tester Monitoring Schedule

Thank You

Thank you for volunteering as a Chester Tester. We at CRA hope you enjoy your active role in monitoring the Chester and helping to provide a detailed record of water quality. You are helping a great deal by providing us with the tools to identify and track sources of nutrients and sediments that are degrading the Chester River.