

Licking County Soil & Water Conservation District

Stream Team Manual



Licking County Soil & Water Conservation District

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Stream Team

Volunteer Stream Monitoring Program

Introduction and Purpose

Approximately 97% of the water on Earth is salt water and there is approximately 3% fresh water on Earth. Since much of the fresh water is unavailable as glaciers, ice, water vapor, etc., there is effectively less than 1% of Earth water to fulfill the needs of life on Earth as we know it. Most of the human body is made up of water, with cells consisting of 65-90% water by weight. Without water there would be no survival. These simple facts seem to be common knowledge. So if water is so important, why is this valuable resource often taken for granted?

As Licking County Soil and Water Conservation District (SWCD) strives to enhance and protect our natural resources, especially water, we would like to take the first step in gaining community involvement and ownership. As this goal is accomplished, the community will gain a better understanding and respect for water, water quality, and why it is important to become stewards of the land. Our community will also become more aware that they live in a watershed and the things individuals do everyday affects the water everyone uses.

In Ohio, the lack of comprehensive and accurate water quality information is a major issue when one wants to look at the various impacts a community has on the environment. Locally gathered assessment information can be used to educate watershed residents and government officials about the realities of water quality in their community.

The water quality sampling or trend monitoring is an important component because it allows watershed residents the opportunity to analyze “their” water and obtain a better understanding of the quality of the water resources of “their” watershed. Monitoring not only provides the opportunities to document current water resource conditions, but can serve as benchmark to gauge changes over time. Should conditions change with the stream quality, the prior collected information documents what conditions were like in the past.

The information contained in this manual is based on the sampling or trend monitoring method. To get an accurate representation of a stream’s water quality, active monitoring needs to be performed on a regular basis over a period of years. Sampling or trend monitoring provides a broad view of the stream allowing the seasonal variations to be sorted out from long-term changes. Please consider the long-term commitment involved in this type of monitoring.

Licking SWCD would like to thank the Ohio Farm Bureau Agricultural Watershed Awareness and Resource Evaluation (AWARE) Program and the Miami Conservancy District for their assistance and guidance.

Have Questions? Need more supplies? Please do not hesitate to contact us:

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Safety Considerations

One of the most critical considerations for a water quality monitoring program is the safety of its volunteers. All volunteers should be trained in safety procedures and should carry with them a set of safety instructions and the phone number of a person to contact in case of an emergency. Safety precautions can never be overemphasized!

The following are some basic safety rules.

- Always monitor with at least one partner so that if there is an injury, someone can go for help. At the very least, let someone else know where you are, when you intend to return, and what to do if you don't come back at the appointed time.
- Honor private property rights. Never cross a landowner's property without permission.
- Never wade in swift or high water. Do not wade if depth is greater than knee-deep. Do not monitor if the stream is at flood stage. Any stream is dangerous in times of flooding.
- Never drink the water in a stream. Assume it is unsafe to drink and bring your own water from home.
- During monitoring, keep your hands away from eye and mouth areas. After monitoring, thoroughly wash your hands with antibacterial soap. Never eat after monitoring without first washing your hands.
- Beware of polluted streams that are known or are posted to be unsafe for handling or human contact. If the water appears to be severely polluted, **STAY OUT!** As a rule, treat every stream as if it were polluted – wear waders, rubber gloves, and protective eyewear.
- Have a first aid kit on hand. Consider having at least one team member trained in first aid/CPR.
- Develop a safety plan. Find out the location and telephone number of the nearest medical center and write down directions for traveling there. Also complete an emergency medical form that includes emergency contacts, insurance information, and pertinent health information such as allergies, diabetes, epilepsy, etc.
- Listen to weather reports. Never monitor if severe weather is predicted or if a storm occurs.
- Be very careful when walking in the stream. Wear shoes that are in good condition and have traction. Rocky-bottom streams can be very slippery and may contain deep pools. Muddy-bottom streams may also prove dangerous where mud, silt, and sand have accumulated in sinkholes. If you must cross the stream, use a walking stick to steady yourself. Your partner(s) should wait on dry land ready to assist

you if you fall. Do not attempt to cross streams that are swift and above the knee in depth. Watch for barbed wire fences or sharp, rusty objects that may pose a particular hazard.

- Do not walk on unstable stream banks. Disturbing these banks and the vegetation growing upon them, can accelerate erosion and lead to a collapse.
- Beware of animals. Watch for irate dogs, farm animals, wildlife, and insects such as ticks, mosquitoes, and hornets. Know what to do if you are bitten or stung.
- Beware of plants. Watch for poison ivy, poison oak, sumac, and other skin-irritating vegetation.
- If you drive, park in a safe location. Be sure your car does not pose a hazard to other drivers and that you are not trespassing. If you are sampling from a bridge, take special precautions. Watch out for passing traffic and never lean over the bridge unless you are firmly anchored.
- **If at any time you feel uncomfortable about the condition of the stream or your surroundings, stop monitoring and leave the site at once. Your safety is more important than the data!**

Why Monitor?

Monitoring is the collection of data (measured parameters) using consistent methods. The types of monitoring and the reasons for collecting data will vary depending on the individual/groups purpose. Water quality monitoring can evaluate the physical, biological and chemical characteristics of a water body.

The information obtained through the “Stream Team” volunteer watershed monitoring can be used for many purposes:

- Evaluate the physical, biological, and chemical characteristics of a water body
- Educate citizens about their stream and environmental stewardship
- To screen water quality problem sites along a stream
- Determine the severity of a pollution problem and to rank stream sites
- Determine long and short term water quality trends
- Evaluate the effectiveness of pollution control activities

Setting your Own Goals

What do you as an individual want to achieve; what do you want to learn and what are your interests?

Data Collection or Scientific Goals:

- Plan, implement and analyze a scientific investigation
- Develop field skills necessary for water quality testing
- Strengthen observational, analytical and problem-solving skills
- Compile and compare water quality data
- Use and integrate several disciplines (chemistry, biology, geography, math, etc.)

Community Goals:

- Become actively involved in community-supported water quality monitoring program
- Develop an awareness and responsibility to their watershed as an individual and as a community
- Communicate findings and the results of their actions to the community

Environmental Education Goals:

- Become familiar with the river ecosystem
- Learn to recognize water quality problems and their sources
- Understand relationships between land use and water quality
- Make a responsible, action-oriented contribution toward protecting the river and watershed.
- Develop and understanding on how weather, seasons and natural disasters affect water quality

What's your Goal?

Write your individual goal(s) below:

What is a Watershed and Why Should I Care?

A watershed is an area of land that drains to a stream, river, or lake. During rainfall events, some rainwater soaks into the ground. The rest of this rainwater runs along the surface of the ground until it collects in a low area (often a river, stream, or lake). Water that runs along the surface of the ground is called runoff. As the runoff travels over the ground's surface, it collects sediment, chemicals, litter and other pollutants, and carries them to our waterways.

Each watershed is unique. Every watershed has its own mix of natural and human-made features. Watersheds are powered by gravity. Hills and ridges form boundaries from which water drains into or away from the watershed. Water drains from higher slopes and collects in the lowest points - rivers, streams, and lakes.

Watersheds can be any size; some are quite large and some are quite small. They can encompass a few acres around a small country stream or all of the states surrounding a large river. Smaller watersheds make up larger watersheds. The Licking River watershed is part of the Muskingum River watershed which is part of the Ohio River watershed.

Everyone lives in a watershed. Everyone's actions impact our water quality. Watersheds provide water for human consumption, industry, agriculture and recreation. Many animals make their home in water. Other wildlife uses our rivers, streams and lakes as their source for drinking water. Do you know the source of your drinking water?

Types of Pollution

Many people think water pollution comes from a chemical spill or a factory dumping directly into the water. This type of pollution is called Point Source Pollution. We can easily trace the source of this type of pollution. Point Source Pollution laws and the associated regulatory/enforcement agencies have done a respectable job of curbing Point Source Pollution and preventing future issues.

One of the major problems facing our waterways is Non-Point Source Pollution. This type of pollution comes from a variety of sources over a wide area, making it harder to detect the direct source or polluter. These pollutants are carried into our waterways by runoff. Non-Point Source Pollutants include sediment, lawn chemicals, litter, oil, household hazardous wastes, and many other items found in and around your home. The best way to combat Non-Point Source Pollution is educating yourself, and your family and friends on simple, cost effective measures we can implement to prevent water pollution.

What Can I Do?

The following are some steps you can take to help keep our water clean.

Don't Litter – Litter often makes its way into our rivers, streams, and lakes. It can harm wildlife and increase pest populations. It is also illegal.

Recycle Used Motor Oil – Most instant oil change stores will take your used motor oil for recycling. Never pour oil down the drain or on the ground. One quart of oil can contaminate two million gallons of water.

Use Lawn / Agricultural Chemicals Responsibly – Always follow chemical directions carefully. Do not apply more chemicals than needed. Pay attention to the weather. Do not apply chemicals when rain is likely. Consider using natural fertilizers and pest controls.

Take Chemicals to Household Hazardous Waste Collections – Your home contains many hazardous wastes including batteries, cleaning solutions, pool chemicals and others. These items can cause water pollution when disposed of improperly. Never pour household hazardous wastes down the drain or throw them in the garbage. Take them to household hazardous waste collection days.

Clean Up Pet Waste – If possible dispose of pet wastes in the toilet or garbage. These wastes contain nutrients and pathogens that can contaminate our waterways.

Don't Dump in Storm Drains – Storm drains or storm sewers often drain directly into a creek or river without any treatment. Anything poured down these drains becomes part of these waterways.

Maintain Your Septic System – Leaking or improperly functioning septic systems can cause water pollution. Having septic systems inspected or pumped every 3 to 5 years can help prevent water pollution. This maintenance can also improve the function of your septic system.

Site Selection and Delineation

When selecting your monitoring site, please keep a few things in mind. Keep safety for the individual(s) conducting the monitoring in mind at all times. As a result, the sampling location must be easily accessible during the time(s) of the year when monitoring takes place. Avoid monitoring sites that are prone to flooding or have steep and/or unstable banks. The monitoring locations should be a fair representation of the system or condition being studied. Once selected, the monitoring locations should be easily identified on a map and in the field to have the ability to repeat the gathering of information at the same location each time monitoring takes place.

To become more familiar with your selected site, sketch a composite or take a picture of the area. Make sure to include unique characteristics of the area such as a large tree, large rock, land feature, or a bend in the stream. This completed sketch/photo will provide you with a visual record of your survey area. Remember you or another volunteer will be coming back to the same spot again and again, so be specific as you can.

Habitat Survey

The stream habitat survey is an easy way to evaluate the streams surroundings. This can be used as a screening tool to identify water quality problems along with an educational tool to teach citizens about pollution and stream ecology.

Evaluate the assessment elements. Your survey site is everything you can see.

- I. Substrate (Bottom Type)
 - a. Size – This is referring to the size of stone or rocks in the bed of the stream
 - b. Smothering – This is referring to if there is a presence or no presence of silt deposits around the stones or rocks on the stream bed. If it is hard to move the rocks, they are probably smothered. Smothered rock bottoms are black with very few insects attached.
 - c. Silting – Lightly kick the bottom of the stream resulting in clouding of the stream. If this clouding lasts for more than a minute, then silting is present.
- II. Fish Cover (Hiding Places) Mark all that apply.
 - a. Underwater Tree Roots (Large) – Are there large visible tree roots (.5 inches in diameter and larger) that are exposed in the water? These make good hiding places for fish and other aquatic animals.
 - b. Underwater Tree rootlets (Fine) – small visible tree roots (.5 inches in diameter and smaller) exposed in the water that make good hiding places for fish and other aquatic animals.
 - c. Boulders – Large oversized rocks
 - d. Backwaters, Oxbows or Side Channels – Inflow of another water source merging with stream / river
 - e. Downed Trees, Logs, Branches – These are great hiding places for fish and other aquatic animals.
 - f. Water Plants
 - g. Shallow Slow Areas for small Fish
 - h. Deep Areas (Chest Deep)
 - i. Shrubs, Small Trees that hang close over the bank
 - j. Undercut Banks – Where erosion has started to eat away the bank
- III. Stream Shape and Human Alterations
 - a. Look at Pictures – Which one best fits your sampling area
 - b. Read descriptions – Which one best fits your sampling area
- IV. Stream Forests & Wetlands (Riparian Area) & Erosion
 - a. Width – Which one best fits your sampling area
 - b. Land Use – Mark all that apply.
 - c. Bank Erosion – Which one best fits your sampling area
 - d. How much stream is shaded – Which one best fits your sampling area
- V. Depth & Current Velocity
 - a. Deepest pool is at least – Which one best fits your sampling area
 - b. Flow types that you see – Mark all that apply.
- VI. Riffles / Runs (Areas where the current is fast and or turbulent; Surface may be broken).
 - a. Riffles / Runs – Riffles are where the water flows over rocks and makes the “stream sound”, adding oxygen back into the water. Runs are straight free flowing water areas.
 - b. Riffle / Run Substrates – Observe the size of the stones and rocks that make up the riffle areas.

Once you have completed the Citizen’s Qualitative Habitat Evaluation Index sheet – add up the total score. This score will give you your Citizen’s Qualitative Habitat Evaluation Index (CQHEI) Score. The descriptions of scores are below and on the back of the form.

Citizen’s Qualitative Habitat Evaluation Index (CQHEI) Scoring Guideline
(Scores adapted from OEPA QHEI Form)

CQHEI Scores:

- 0 – 49 Moderate to extensive human-made modifications to stream/river. These water bodies would generally be classified as “Modified Warm Water Habitats”. Channelized treeless ditches with very little depth and poor flow rate could have a CQHEI score of 30 or 40. Silt and muck included in the same stream scores could range in the 20s.

- 50 – 60 Streams/rivers with this score range generally can attain Warm Water Habitat biological communities. Although, depending on which features (e.g. flow, depth) are missing, the biological communities may fall short of Warm Water Habitat classification.

- 61 - 69 Streams/rivers scoring in this range have enough positive habitat features available to attain Warm Water Habitat (e.g. depth, flow, forest canopy over stream/river).

- 70 – 100 Streams/rivers scoring in this range are capable of supporting “Exceptional Warm Water Habitat” biological communities (e.g. good flow, good riffles and pools, good substrates, and good riparian quality).

Biological Survey

The stream biological survey is based on the sampling of macroinvertebrates and other aquatic organisms living in the stream. For this survey you will be collecting and identifying macroinvertebrates in the field and calculating a stream quality rating.

Step 1: First you will need to identify your three sampling areas and indicate them on your site sketch/photo that you completed of the area. When sampling always start down stream and work up stream so when you disturb the area you are not disturbing your sampling data. Your three sampling spots should be marked as Site 1 – farthest down stream, Site 2 – is the middle site and Site 3 – is the furthest upstream.

Step 2: Gather your equipment and start at Site 1. Remember, Site 1 is the sampling site farthest downstream.

Fill a sampling container half way with water from the stream. This will be used to collect all of the macroinvertebrates that you catch.

When entering the stream you should always enter downstream and walk up stream to sampling site to minimize the possibility of biasing your second and third collection sites.

You will be using a kick or a dip net to collect the specimens. First make sure the net(s) are clean. Next enter the stream very carefully. To use the kick net you will have one person hold the net handles open at a 45 degree angle to the waters surface. The net should be opened so that the stream is flowing through the net. Be sure to secure the bottom of the net so it fits tightly against the bottom of the stream bed with a few rocks. Do not allow the water to flow over the top of the net.

The second person will be the collector. This person will gently pick up rocks from the stream bed turn them over and look for macroinvertebrates. Once they place visual specimens in the collecting bucket filled half way with water they can gently rub the rest of the rock with their hands under the water and in front of the net, allowing anything they might have missed flow into the net. After they have wiped all the large rocks with your hands you should thoroughly stir up the sampling area with your feet. This will dislodge hiding or burrowing organisms. As a guide you should disturb the area for approximately 60 seconds.

Step 3: Remove your anchors and carefully pick up the net. Be careful that you do not allow any of your collected organisms to float away.

Step 4: Observe what type(s) of aquatic organisms you collected by placing them in your collecting bucket.

Step 5: Wash off net and complete sampling of Site 2 and Site 3. Put the samples from all three sites into the same bucket.

Step 6: Sort and Identify your macroinvertebrates by using the taxonomic key provided. Use body shape, size and other characteristics to identify the organisms. Record the results on the Biological Monitoring Data Sheet.

Step 7: Calculate stream quality rating. The stream quality rating takes into account the pollution sensitivity of the organisms and their diversity. Macroinvertebrates are classified into three categories based on their pollution tolerance or sensitivity. A stream quality rating is calculated by estimating the number of specimens in each sensitivity category (Rare (R = 1-9); Common (C =10-99); Dominant (D = 100 +)); multiplying the number of types of organisms in each category by a weighting factor; adding the scores; and comparing the results to a stream quality scale.

Step 8: Check for completeness of the Biological Survey and return all organisms safely to the stream after sampling and data collection is completed.

Chemical Survey

The chemical water quality monitoring consists of the collection of water samples and their analysis for specific chemical constituents.

Water quality monitoring can be used for many purposes:

- To identify whether waters are meeting designated uses
- To evaluate the effectiveness of pollution control programs
- To determine long and short term water quality trends
- To screen for impairments
- To educate watershed residents and increase awareness about local water resources

Create a Stream Chemical Survey Schedule

It is best to visit your site and sample at least four times a year, during the different seasons (i.e. early spring, early summer, late summer, and fall). Do remember, the more you sample, the more data you collect, and the better you can determine what is going on with the water quality.

Remember safety first! Your safety is more important than the data you are collecting.

Conducting the Chemical Survey

Step 1: Pick a sampling site that represents a water sample that is typical of the water source and does not represent a localized condition.

Step 2: Collect the water sample.... Usually water samples are collected away from the stream bank and in the main current. You should never collect a water sample in stagnant water or water that you have disturbed while entering the stream. Stand facing upstream and collect your water sample in front of you.

Step 3: Rinse the sample container two or three times with the water you will be sampling. Deposit rinse water downstream from the actual sample site.

Step 4: Collect a water sample mid-way between the surface and the bottom of the stream.

Step 5: Complete the data sheet.

Step 6: Check to make sure your data forms are complete and pour water samples into the waste water container. When you get home, pour the waste water down the toilet or sink. For coliform bacteria, add 1/3 tsp (20 drops) of household chlorine bleach to the test tube and recap immediately. Let tube stand upright for at least 4 hours. Then dispose of closed tubes in the trash. Do not open tubes.

Coliform Bacteria and Why it is Important

Coliform bacteria are used as indicators of possible sewage contamination because they are commonly found in human and animal feces. Although they are generally not harmful themselves, they indicate the possible presence of disease causing bacteria, viruses, protozoans that also live in human and animal digestive systems. The presence of these bacteria in streams suggests that disease-causing microorganisms might also be present and that swimming and eating shellfish might be a health risk. Since it is difficult, time-consuming, and expensive to test directly for the presence of a large variety of pathogens, water is usually tested for coliform bacteria as a group instead. Sources of fecal contamination to surface waters include wastewater treatment plants, sanitary and combined sewer overflows, on-site wastewater treatment systems, domestic and wild animal manure, and storm run-off.

In addition to the possible health risk associated with the presence of elevated levels of fecal bacteria, they can also cause cloudy water, unpleasant odors, and increased oxygen demand.

Coliform bacteria levels of less than 200 colonies per 100 ml of sample are an indication of good water quality. If coliform bacteria levels rise above 200 colonies per 100 ml of sample, water is considered poor.

Biochemical Oxygen Demand (BOD) and Why it is Important

Biochemical oxygen demand (BOD) measures the amount of oxygen consumed by microorganisms in decomposing organic matter in stream water. A test is used to measure the amount of oxygen consumed by these organisms during a specific period of time (usually 5 days at 20°C). The rate of oxygen consumption in a stream is affected by a number of variables: temperature, pH, the presence of certain kinds of microorganisms, and the type of organic and inorganic material in the water.

BOD directly affects the amount of dissolved oxygen in rivers and streams. The greater the BOD, the more rapidly oxygen is depleted in the stream. This means less oxygen is available to higher forms of aquatic life which could lead to suffocation or death. Sources of BOD include leaves and woody debris, dead plants and animals, animal manure, wastewater treatment plants, feedlots, and food-processing plants, failing septic systems, and urban storm water runoff. BOD is affected by the same factors that affect dissolved oxygen. Aeration of water by rapids and waterfalls will accelerate the decomposition of organic and inorganic material. Therefore, BOD levels at a sampling site with slower moving water may be higher in comparison to more aerated water. Chlorine can also affect BOD measurement by inhibiting or killing the microorganisms that decompose the organic and inorganic matter in a sample. If sampling in chlorinated waters, such as those below the effluent from a sewage treatment plant, it may be necessary to neutralize the chlorine.

BOD measurement requires taking two samples at each site. One is tested immediately for dissolved oxygen, and the second is incubated at room temperature in the dark for 5 days and the tested for the amount of dissolved oxygen remaining. The difference in oxygen levels between the first test and the second test, in parts per million (ppm), is the amount of BOD. This represents the amount of oxygen consumed by microorganisms to break down the organic matter present in the sample bottle during the incubation period.

Unpolluted, natural waters have a BOD of 6 ppm or less, indicating good water quality. If BOD levels increase to above 8 ppm, water quality is considered poor.

Dissolved Oxygen (DO) and Why it is Important

Dissolved Oxygen (DO) is the concentration of oxygen that is dissolved in water. All fish and aquatic life must have adequate amounts of DO in the water at all times to survive. A stream system both produces and consumes oxygen. Problems occur when organic material enters surface water. Microorganisms in the water use the organic material as food and consume DO in the process. Other sources of oxygen – consuming waste include stormwater runoff from farmland or urban streets, feedlots, and failing septic systems. When DO levels decline, some sensitive animals may move away, weaken, or die.

DO levels fluctuate seasonally and over a 24-hour period. They vary with water temperature and altitude. Cold water holds more oxygen than warm water and water holds less oxygen at higher altitudes. The DO in rivers and streams changes horizontally along the course of the waterway. The DO levels in and below riffle areas, waterfalls, or dam spillways are typically higher than those found in pools and slower-moving stretches. Since DO levels are critical to fish, a good place to sample is in the pools that fish tend to favor or in the spawning areas they use.

DO is measured either in parts per million (ppm) or “percent saturation.” Ppm is the amount of oxygen in a liter of water. Percent saturation is the amount of oxygen in a liter of water relative to the total amount of oxygen the water can hold at that temperature. The amount of dissolved oxygen required varies according to species and stage of life. DO levels of 5 to 6 ppm are usually required for growth and activity. DO levels below 3 ppm are stressful to most aquatic organisms. Dissolved oxygen levels of 5 ppm or more is an indication of good water quality. If dissolved oxygen levels fall below 4 ppm, water quality is considered poor.

Nitrates and Why they are Important

Introduction

Nitrogen makes up about 80 percent of the air that we breathe and is an essential component of proteins. In aquatic systems, the inert nitrogen gas (N) is converted to useable forms by bacteria which can then be taken up by algae and other plants. These forms of nitrogen include ammonia (NH₃), nitrates (NO₃), and nitrites (NO₂). Nitrates are essential plant nutrients, but in excess can cause significant water quality problems. Together with phosphorus, nitrates in excess amounts can accelerate dramatic increases in aquatic plant growth and changes in the types of plants and animals that live in the stream. This, in turn, affects other water quality indicators. The natural level of nitrate in surface water is typically low (less than 3 ppm).

High levels of nitrates are generally the result of improperly treated sewage, either from wastewater treatment plants or failing on site-septic systems, runoffs from fertilized lawns and cropland, runoff from animal manure storage areas, and industrial discharges that contain corrosion inhibitors. Nitrates from land sources in d up in rivers and streams quickly because they dissolve in water more readily than other nutrients. Water that is polluted with nitrogen-rich organic matter might show low levels of nitrates.

Decomposition of organic matter lowers the dissolved oxygen level, which in turn slows the rate at which ammonia is oxidized to nitrite and then to nitrate. The growth of algae and aquatic plants is stimulated principally by nutrients such as phosphorus and nitrogen. Nutrient-stimulated plant production is of most concern in lakes and estuaries. Plant production in streams and rivers is most often controlled by physical factors, such as light penetration, timing of flow, and type of substrate available, instead of by nutrients.

The natural level of nitrate in surface water is typically less than 3 ppm. Nitrate concentrations of 5 ppm or less are an indication of good water quality. If nitrate levels rise above 20 ppm, water quality is considered poor.

pH and Why it is Important

pH is a term used to indicate the alkalinity or acidity of a substance as ranked on a scale from 1.0 to 14.0. A pH of 7.0 is neutral and ideal for water conditions. Readings that fall below 7.0 identify acidic conditions while readings above 7.0 identify alkaline conditions.

pH affects many chemical and biological processes in the water. Low pH can allow toxic elements and compounds to become mobile and “available” for uptake by aquatic plants and animals. The pH scale measures the logarithmic concentration of hydrogen (H⁺) and hydroxide (OH⁻) ions, which make up water. When both types of ions are in equal concentration, the pH is 7.0 or neutral.

A range of pH 6.5 to pH 8.5 is optimal for most aquatic organisms. pH level at or near 7.0 is an indication of good water quality. If pH levels increase to above 8.0 or decrease to below 6.0, water quality is considered poor.

Phosphates and Why they are Important

Phosphorus like nitrogen is an essential nutrient for the plants and animals that make up the aquatic food web. Phosphorus is the nutrient that is in short supply in most fresh waters. There are many sources of phosphorus, both natural and human. These include soil and rocks, effluent from wastewater treatment plants, runoff from fertilized lawns and cropland, failing on-site septic systems, and drained wetlands.

Phosphorus usually exists as part of a phosphate molecule (PO₄). Inorganic phosphorus is the form required by plants. Animals can use either organic or inorganic phosphate. In unimpaired waters, phosphorus concentrations are normally low, with phosphorus availability being the limiting factor in the growth of plants.

The natural levels of orthophosphate in surface water are typically between 0.005 and 0.05 ppm. Phosphate concentrations of 2 ppm or less are an indication of good water quality. If phosphate levels rise above 4 ppm, water quality is considered poor.

Temperature and Why it is Important

Water temperature is one factor in determining which species of aquatic organisms may or may not be present in the aquatic system. The rates of virtually all physical, biological, and chemical processes

depend on temperature. Aquatic organisms are dependent on temperature for their optimal health. Temperature affects the oxygen content of the water; the rate of photosynthesis by aquatic plants; the metabolic rates of aquatic organisms; and the sensitivity of organisms to toxic wastes, parasites, and diseases.

Causes of temperature change can be the result of direct discharge of heated or cooled waters; however, deforestation and improper land use are often greater factors. As trees and other shading vegetation are removed, the stream receives greater amounts of direct sunlight, increasing both water temperature and algal productions, and decreasing the amount of oxygen present. Since organisms are adapted to specific temperature ranges, even small fluctuations can impact the balance and health of a stream.

Temperature in a stream will vary with width and depth. In a stream, the temperature will be relatively constant as long as the stream is uniformly in the sun or shade. Temperature preferences among species of aquatic organisms vary widely. Temperature changes of less than 5° Celsius are an indication of good water quality. If the stream temperature changes 10° or more Celsius, water quality is considered poor.

Turbidity and Why it is Important

Turbidity is a measure of water clarity. It measures how much the suspended material in the stream water decreases the passage of light through the water column. Turbidity can also affect the color of the water. Higher turbidity levels increase water temperatures because suspended particles absorb more heat. This, in turn, reduces the concentration of dissolved oxygen (DO) because warm water can hold less DO than cold. High turbidity levels also reduce the amount of light penetrating the water, which reduces photosynthesis and the production of DO. Sources of turbidity include soil erosion, waste discharge, urban runoff, eroding stream banks, and large numbers of bottom feeders.

Turbidity can be useful as an indicator of the effects of runoff from construction, agricultural practices, logging activity, and other sources. Turbidity increases sharply during rainfall and also during dry-weather if earth-disturbing activities are occurring in or near a stream without erosion control practices in places.

Moderately low levels of turbidity may indicate a healthy, well- functioning ecosystem. High turbidity is an indicator of either runoff from disturbed or eroded soil or blooms of microscopic organisms due to high nutrient inputs. Very clear water is typical of unproductive water supporting only sparse plant and animal life. Turbidity measurements of 40 or less are an indication of good water quality. If turbidity levels rise above 100, water quality is considered poor.

Monitoring Site Delineation

Stream Name: _____

County: Licking State: Ohio

Watershed Address: _____

Investigators: (# Adults and/or # of Students) _____

Site Description: _____

Date: _____ Time: _____

Weather in past 24 hours:

- Storm (heavy rain)
- Rain
- Showers (intermittent rain)
- Overcast
- Clear / Sunny

Weather now:

- Storm (heavy rain)
- Rain
- Showers (intermittent rain)
- Overcast
- Clear / Sunny

Other factors or conditions you think may affect today's observations:

Comments:

(Note changes or potential problems such as spills, new construction, type of discharging pipes, etc.).

Sketch or Photo of Monitoring Site

On your sketch, note features that affect stream habitat such as: riffles, runs, pools, ditches, wetlands, dams, riprap, discharge pipes, tributaries, landscape features, vegetation, roads, etc.

Chemical Test Record

Date	Test	Results
6/5/2012	Phosphate	2 ppm
	Temperature	
	Turbidity	
	pH	
	Phosphate	
	Nitrate	
	Dissolved Oxygen (DO)	
	Biological Oxygen Demand (BOD)	
	Coliform Bacteria	

Citizen's Qualitative Habitat Evaluation Index

**CQHEI
Score**

Date:

Length of Reach Evaluated: 150 m 200 m 500 m Other: _____

River Code: River Mile: River/ Site:

I. Substrate (Bottom Type) Score:

a.) Size

- | | | | |
|--|--|---|---|
| <input type="checkbox"/> Mostly Large (Fist Size or Bigger)
14 pts | <input type="checkbox"/> Mostly Medium (Smaller Than Fist Bigger Than Fingernail)
10 pts | <input type="checkbox"/> Mostly Small (Smaller Than Fingernail, But Still Coarse)
6 pts | <input type="checkbox"/> Mostly Very Fine (Not Coarse, Sometimes Greasy or Mucky)
0 pts |
|--|--|---|---|

b.) "Smothering"

- Yes** 0 pts **No** 5 pts
- Are Fist Size and Larger Pieces Smothered By Sands/Silts?

Symptoms:
Hard to Move Large Pieces, Often Black on Bottom w/Few Insects

c.) "Siltling"

- Yes** 0 pts **No** 5 pts
- Are Silts and Clays Distributed Throughout Stream?

Symptoms:
Light Kicking of Bottom Results in Substantial Clouding of Stream for More than a Minute or Two

II. Fish Cover (Hiding Places) - 2 Points For Each One Present Score:

- | | | | | | |
|--|--|---|--|--|---|
| <input type="checkbox"/> Underwater Tree Roots (Large)
2 pts | <input type="checkbox"/> Boulders
2 pts | <input type="checkbox"/> Downed Trees, Logs, Branches
2 pts | <input type="checkbox"/> Water Plants
2 pts | <input type="checkbox"/> Deep Areas (Chest Deep)
2 pts | <input type="checkbox"/> Undercut Banks
2 pts |
| <input type="checkbox"/> Underwater Tree Rootlets (Fine)
2 pts | <input type="checkbox"/> Backwaters, Oxbows or Side Channels
2 pts | <input type="checkbox"/> Shallow, Slow Areas for Small Fish
2 pts | <input type="checkbox"/> Shrubs, Small Trees That Hang Close Over the Bank
2 pts | | |

III. Stream Shape and Human Alterations Score:

a.) "Curviness" or "Sinuosity" of Channel

- | | |
|--|--|
| <input type="checkbox"/> Very Straight
0 pts | <input type="checkbox"/> Mostly Straight Some "Wiggle"
3 pts |
| | |
| <input type="checkbox"/> 1 or 2 Good Bends
6 pts | <input type="checkbox"/> 2 or More Good Bends
8 pts |
| | |

a.) How Natural Is The Site?

- | | |
|---|--|
| <input type="checkbox"/> Mostly Natural
12 pts | <input type="checkbox"/> Many Man-made Changes, but still some natural conditions left (e.g., trees, meanders)
6 pts |
| <input type="checkbox"/> A Few Minor Man-made Changes (e.g., bridge, some streambank changes)
9 pts | <input type="checkbox"/> Heavy, Man-made Changes (e.g., channelized, leveed,)
0 pts |

IV. Stream Forests & Wetlands ("Riparian Area") & Erosion Score:

- | | | |
|---|---|--|
| a.) Width - Mostly: | b.) Land Use - Mostly: | c.) Bank Erosion - Typically: |
| <input type="checkbox"/> Wide (Can't Throw A Rock Through It)
8 pts | <input type="checkbox"/> Forest/Wetland
5 pts | <input type="checkbox"/> Raw, Collapsing Banks
0 pts |
| <input type="checkbox"/> Narrow (Can Throw A Rock Through It)
5 pts | <input type="checkbox"/> Shrubs
4 pts | <input type="checkbox"/> Combination of Stable and Eroding Banks
2 pts |
| <input type="checkbox"/> None
0 pts | <input type="checkbox"/> Overgrown Fields
3 pts | <input type="checkbox"/> Stable Hard or Well Vegetated Banks
4 pts |
| | <input type="checkbox"/> Fenced Pasture
2 pts | |
| | <input type="checkbox"/> Park (Grass)
2 pts | |
| | <input type="checkbox"/> Conservation Tillage
2 pts | |
| | <input type="checkbox"/> Suburban
1 pts | |
| | <input type="checkbox"/> Rowcrop
1 pts | |
| | <input type="checkbox"/> Open Pasture
0 pts | |
| | <input type="checkbox"/> Urban/Industrial
0 pts | |
- d.) How Much of Stream is Shaded?** 3 pts -Mostly 2 pts - Partly 0 pts - None

V. Depth & Current Velocity: Score:

- | | |
|---|---|
| a.) Deepest Pool Is At Least: | b.) Check ALL The Flow Types That You See: |
| <input type="checkbox"/> 8 pts - Chest Deep | <input type="checkbox"/> 2 pts - Very Fast: Hard to Stand in the Current |
| <input type="checkbox"/> 6 pts - Waist Deep | <input type="checkbox"/> 3 pts - Fast: Quickly Takes Objects Downstream |
| <input type="checkbox"/> 4 pts - Knee Deep | <input type="checkbox"/> 1 pts - Moderate: Slowly Takes Objects Downstream |
| <input type="checkbox"/> 0 pts - Ankle Deep | <input type="checkbox"/> 1 pt - Slow: Flow Nearly Absent |
| | 0 pts - No Flow |

VI. Riffles/Runs (Areas Where Current is Fast/Turbulent, Surface May Be Broken) Score:

- | | | | | |
|---------------------------------------|--|--|---|--|
| a.) Riffles/Runs Are: | <input type="checkbox"/> 8 pts - Knee Deep or Deeper & Fast | <input type="checkbox"/> 6 pts - Ankle/Calf Deep & Fast | <input type="checkbox"/> 4 pts - Ankle Deep or Less & Slow | <input type="checkbox"/> 0 pts - Do Not Exist |
| b.) Riffle/Run Substrates Are: | <input type="checkbox"/> 7 pts - Fist Size or Larger | <input type="checkbox"/> 4 pts - Smaller Than Fist Size, but Larger Than Fingernail | <input type="checkbox"/> 0 pts - Smaller Than Your Fingernails | |
- For Most Metrics Intermediate Conditions Can Be Denoted By Checking Two Boxes and Averaging The Scores

Citizen's Qualitative Habitat Evaluation Index (CQHEI)
Score Guideline
(Scores Adopted from OEPA QHEI Form)

CQHEI Scores:

- 0 – 49 Moderate to extensive man-made modifications to stream/river. These water bodies would generally be classified as "Modified Warm Water Habitats". Channelized treeless ditches with very little depth and a poor flow rate could have a CQHEI score of 30 or 40. Silt and muck included in the same stream scores could range in the 20's.
- 50 – 60 Streams/rivers with this score range generally can attain Warm Water Habitat biological communities. Although, depending on which features (e.g. flow, depth) are missing the biological communities may fall short of Warm Water Habitat classification.
- 61 – 69 Streams/rivers scoring in this range have enough positive habitat features available to attain Warm Water Habitat (e.g., depth, flow, forest canopy over stream/river).
- 70 – 100 Stream/rivers scores in this range are capable of supporting "Exceptional Warm Water Habitat" biological communities (e.g., good flow, good riffles and pools, good substrates, and good riparian quality).





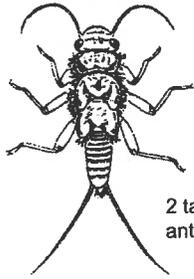
Citizen's Qualitative Habitat Evaluation Index (CQHEI) Scoring Guideline
(Scores adapted from OEPA QHEI Form)

CQHEI Scores:

- 0 – 49 Moderate to extensive human-made modifications to stream/river. These water bodies would generally be classified as “Modified Warm Water Habitats”. Channelized treeless ditches with very little depth and poor flow rate could have a CQHEI score of 30 or 40. Silt and muck included in the same stream scores could range in the 20s.
- 50 – 60 Streams/ivers with this score range generally can attain Warm Water Habitat biological communities. Although, depending on which features (e.g. flow, depth) are missing, the biological communities may fall short of Warm Water Habitat classification.
- 61 - 69 Streams/ivers scoring in this range have enough positive habitat features available to attain Warm Water Habitat (e.g. depth, flow, forest canopy over stream/river).
- 70 – 100 Streams/ivers scoring in this range are capable of supporting “Exceptional Warm Water Habitat” biological communities (e.g. good flow, good riffles and pools, good substrates, and good riparian quality).

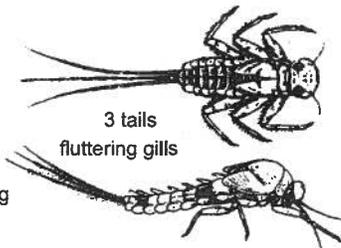
Macroinvertebrate Identification Key

GROUP 1 – Very Intolerant of Pollution



2 tails long antennae

Stonefly Nymph



3 tails fluttering gills

Mayfly Nymph

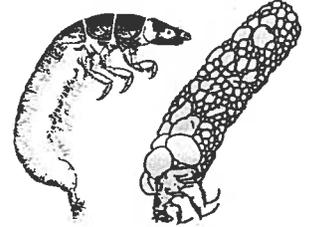


very small & hard shell

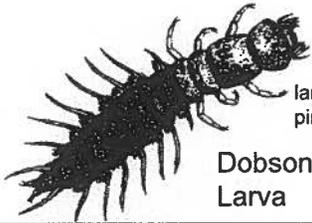
Riffle Beetle Adult & Larva



makes a case from twigs, rocks, leaves

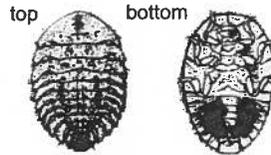


Caddisfly Larva



large head & 2 pinchers

Dobsonfly Larva



top bottom

looks like a suction cup

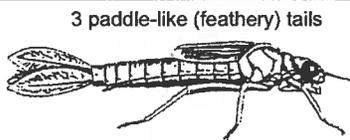
Water Penny Larva



Right-Handed Snail

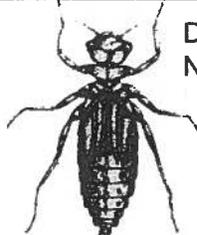
must be alive to count

GROUP 2 – Moderately Intolerant of Pollution



3 paddle-like (feathery) tails

Damselfly Nymph



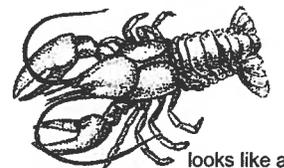
Dragonfly Nymph

no tails large eyes



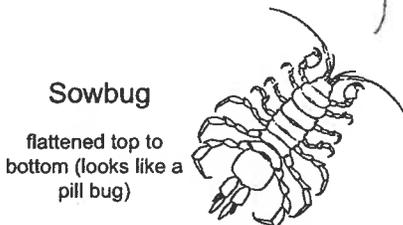
flattened side-ways & swims on side

Scud



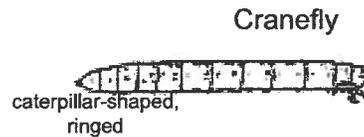
Crayfish

looks like a mini-lobster



Sowbug

flattened top to bottom (looks like a pill bug)



Cranefly

caterpillar-shaped, ringed



Clam/Mussel

must be alive to count

GROUP 3 – Fairly Tolerant of Pollution



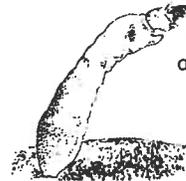
Midge Larva

small, but visible head intense wiggler



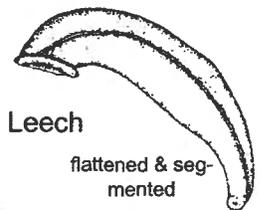
Planaria

2 eye spots & very small



one end is swollen

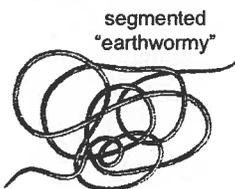
Black Fly Larva



Leech

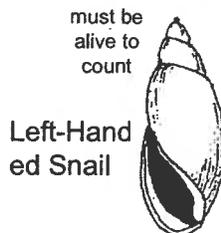
flattened & segmented

GROUP 4 – Very Tolerant of Pollution



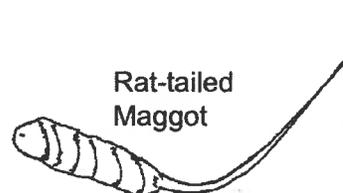
segmented "earthwormy"

Aquatic Worms

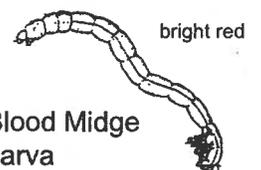


must be alive to count

Left-Handed Snail



Rat-tailed Maggot



bright red

Blood Midge Larva

PROCEDURE

This coliform test can be run using one tube or five tubes. Run the single tube test for a quick screening test to determine if coliform bacteria are present in numbers greater or less than 20 colonies/100mL of water. When five tubes are used, coliform population density can be estimated in terms of the Most Probable Number (MPN) of organisms present, as described in *Standard Methods for the Examination of Water and Wastewater*, 18th edition, Multiple-Tube Fermentation Technique for Members of the Coliform Group.

SINGLE TUBE TEST

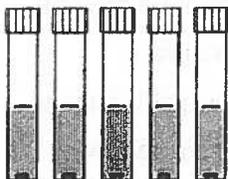
1		2		3		4		5	
Fill the tube to the 10 mL line.		Replace cap.		Stand the tube upright, with tablet (4880) flat on the bottom of the tube.		Incubate the tube upright, at room temperature, for 48 hours. Store out of direct sunlight.		Compare the contents of the tube to the Coliform Bacteria Color Chart (5880-CC).	

Do not remove tablet from the tube. To avoid contamination do not touch the tablet or the inner surface of the cap or tube.

TEST RESULTS	SCORE
Negative	3 (good)
Positive	1 (poor)

Record the score on the Data Sheet.

MOST PROBABLE NUMBER (MPN) TEST

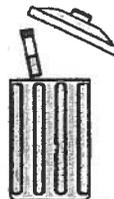
1		2	
Follow the single tube incubation procedure to react 5 tubes at one time.		Compare the appearance of the tubes to the picture on the coliform color chart. Record results for each tube as positive or negative. Count the number of positive tests.	

Do not remove tablet from the tube. To avoid contamination do not touch the tablet or the inner surface of the caps and tubes.

# POSITIVE TUBES	MPN INDEX/ 100 ML*	SCORE
0-2	0-5	3 (good)
3-4	9-18	2 (fair)
5	>18	1 (poor)

Record the score on the Data Sheet.

COLIFORM TEST DISPOSAL PROCEDURE

1		2		3	
One tube at a time, remove the cap and add approximately 1 mL (1/3 tsp or 20 drops) of household chlorine bleach and immediately recap.		4 hours	Let the tubes stand upright for about 4 hours.	Dispose of closed tubes in the trash. Do not open tubes.	

NEVER re-use tubes after coliform bacteria testing.

COLIFORM BACTERIA • MODULE CODE 5880

Fecal coliform bacteria are naturally present in the human digestive tract but are rare or absent in unpolluted waters. Coliform bacteria should not be found in well water or other sources of drinking water. Their presence in water serves as a reliable indication of sewage or fecal contamination. Although coliform bacteria themselves are not pathogenic, they occur with intestinal tract pathogens that are dangerous to human health. This presence/absence total coliform test detects all coliform bacteria strains and may indicate fecal contamination.

FECAL COLIFORM BACTERIA PER 100 ML WATER

Desirable	Permissible	Water Use
0	0	Potable and well water (for drinking)
<200	<1,000	Primary contact (for swimming)
<1,000	<5,000	Secondary contact (for boating & fishing)

**For specific requirements, consult your state, regional, or local health department, or regional USEPA office.*

The coliform test in this kit will indicate if you have above or below 20 coliform colonies per 100 mL of well or river water. Even if the result of the coliform test for your well water is negative, this is not proof that your water is safe to drink. You should always have a professional lab test your drinking water for the presence of coliform bacteria.

COLIFORM REACTION

The Coliform Tablet (4880) contains nutrients to support the growth of coliform bacteria, a gelling substance, and a pH indicator. If coliform organisms are present in the sample, gas will be generated as a result of the bacteria metabolizing the nutrients in the tablet. The gas will be trapped in the gelling substance and cause the gel to rise in the tube. The pH indicator may change color from red to yellow as further evidence of coliform bacteria activity.

- NEGATIVE:**
- Liquid above gel is clear
 - Gel remains at bottom of tube
 - Indicator remains red or turns yellow with no gas bubbles
 - Indicates less than 20 total coliform colonies per 100 mL water when a single tube is used or less than 2 total coliform colonies per 100 mL water when 5 tubes are used

- POSITIVE:**
- Many gas bubbles present
 - Gel rises to surface
 - Liquid below gel is cloudy
 - Indicator turns yellow
 - Indicates more than 20 total coliform colonies per 100 mL water when a single tube is used or less than 2 total coliform colonies per 100 mL water when 5 tubes are used

biochemical oxygen demand **BOD**

- 1 Fill a small test tube (0125) to overflowing with sample water.
- 2 Cap and wrap the tube with aluminum foil and store it in a dark place at room temperature for 5 days.
- 3 Unwrap the tube. Add two Dissolved Oxygen Test Tabs® (3976) to the test tube.
- 4 Cap the tube. Be sure no air bubbles are in the sample.
- 5 Mix by inverting until the tablets have disintegrated (about 4 minutes).



- 6 Wait 5 minutes.
- 7 Compare the color of the sample to the BOD Color Chart (5889-CC). The difference between the Dissolved Oxygen result and the BOD result is the Biochemical Oxygen Demand. Record the result as ppm BOD.

WARNING! This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

LaMotte

PO Box 329
 Chestertown • Maryland • 21620
 800-344-3100

dissolved **OXYGEN**

- 1 Fill a small test tube (0125) to overflowing with sample water.
- 2 Add two Dissolved Oxygen Test Tabs® (3976) to the test tube.
- 3 Cap the tube. Be sure no air bubbles are in the sample.
- 4 Mix by inverting until the tablets have disintegrated (about 4 minutes).



- 5 Wait 5 minutes.
- 6 Compare the color of the sample to the Dissolved Oxygen Color Chart (6663). Record the result as ppm Dissolved Oxygen.

WARNING! This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

LaMotte

PO Box 329 • Chestertown • MD • 21620
 800-344-3100
 R 5/08

pH **WIDE RANGE**

- 1 Fill the test tube (0106) to the 10 mL line.
- 2 Add one pH Wide Range Test Tab® (6459).
- 3 Cap the tube & mix until the tablet has disintegrated.



- 4 Compare the color of the sample to the pH Color Chart (5890-CC). Record the result as pH.

WARNING! This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

LaMotte

PO Box 329 • Chestertown, MD 21620
 800-344-3100
 R 5/8

phosphate

- 1 Fill the test tube (0106) to the 5 mL line.
- 2 Add one Phosphorus Test Tab® (5422).
- 3 Cap the tube & mix until the tablet has disintegrated.



- 4 Wait 5 minutes.
- 5 Compare the color of the sample to the Phosphate Color Chart (5892-CC). Record the result as ppm Phosphate.

WARNING! This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

LaMotte

PO Box 329 • Chestertown • MD • 21620
 800-344-3100
 R 5/06

Turbidity Test

- Before going to your test site:
 - Use a white plastic container that is at least 5 inches deep (i.e. yogurt, cottage cheese, ricotta cheese containers).
 - Stick the black and white secchi disk sticker a little off-centered on the bottom of the white plastic container.
 - Measure 5 inches up from the bottom of the white plastic container.
 - Use a permanent marker or paint to mark the 5 inch line on the inside of the container.
- At your test site:
 - Pick a location that has not been disturbed by you.
 - Fill container with water up to the 5 inch mark.
 - Look straight down into the container and compare the clarity of the secchi disk sticker to the color cards in the manual. The clearer the water, the lower the turbidity (JTU) score will be. Cloudier water gets a higher turbidity score.
 - Record results on the Chemical Test Record data sheet.

The illustration shows the components of the Nitrate Test Kit and the steps for use. It includes a test tube, a color chart, a secchi disk, and a warning label. The steps are numbered 1 through 7.

- 1 Fill the test tube (0106) to the 5 mL line.
- 2 Add one Nitrate #1 TesTab® (2799).
- 3 Cap the tube & mix until the tablet has disintegrated.
- 4 Add one Nitrate #2 CTA TesTab® (NN-3703).
- 5 Cap the tube & mix until the tablet has disintegrated.
- 6 Wait 5 minutes.
- 7 Compare the color of sample to the Nitrate Color Chart (5891-CC). Record the result as ppm Nitrate.

nitrate

WARNING! This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

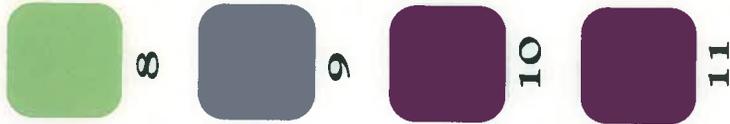
Lamotte

PO Box 329 • Chestertown • MD • 21620
800-344-3100
R 508

Temperature Test

- Before going to your test site:
 - Remove paper backing from both thermometers (a.k.a temperature sticks) and firmly stick both thermometers to the outside of your white plastic container close to the bottom of the container.
 - The shorter thermometer measures cold water temperatures. The longer thermometer measures common water temperature during our warmer months.
 - Both thermometers use liquid crystal to measure water temperature in degrees Celsius.
- At your test site:
 - Firmly hold the white plastic container making sure your hands are as far away from the thermometers as possible.
 - Place the container in the water so the thermometers are 4 inches below the surface of the water.
 - Hold the thermometers in the water for 1 minute.
 - Remove the thermometers from the water and read the results. The exact temperature on the long thermometer is indicated by a *green* display. (The green display usually appears between a blue and a reddish tan display).
 - Record results on the Chemical Test Record data sheet.

pH WIDE RANGE



Code 5890-CC

Coliform BACTERIA

positive



Many gas bubbles present.
Gel rises to surface.
Liquid below gel is cloudy.
Indicator turns yellow.

negative

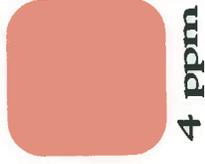
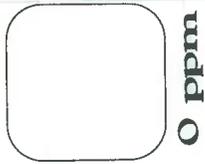


Liquid above gel is clear.
Indicator remains red or turns yellow with no gas bubbles.
Gel remains at bottom of tube.

Code 5850-CC

dissolved OXYGEN

biochemical BOD oxygen demand



Peachy Pink

Orangey-Pink

Code 5889-CC

pH Wide Range

- 4 - Pink
- 5 - Orangey-Pink
- 6 - Yellow
- 7 - Greenish-Yellow
- 8 - Green
- 9 - Slate Blue
- 10 - Dark Purple
- 11 - Slightly Lighter Purple

nitrate



Pale Pink
Light Pink
Dark Pink

phosphate

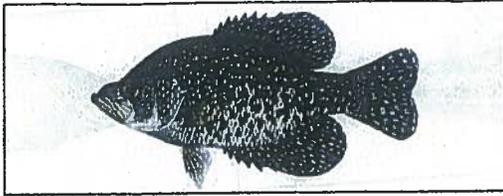


Sky Blue
Light Gray/Blue
Slate Blue

turbidity



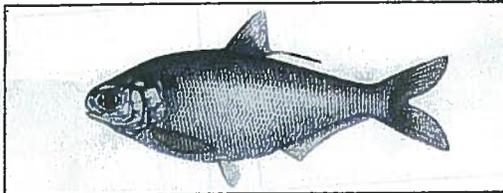
Clear Water
Somewhat Cloudy Water
Very Cloudy Water



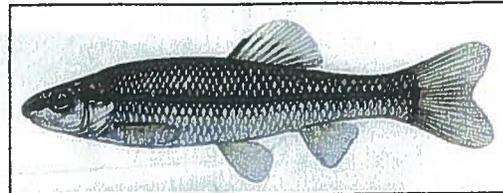
COMMON NAME: BLACK CRAPPIE
OTHER NAMES: PAPERMOUTH, SPECKS
SCIENTIFIC NAME: *Pomoxis nigromaculatus*



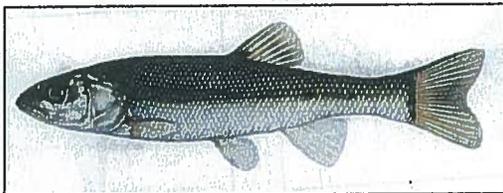
COMMON NAME: WARMOUTH
OTHER NAMES: WARMOUTH BASS
SCIENTIFIC NAME: *Lepomis gulosus*



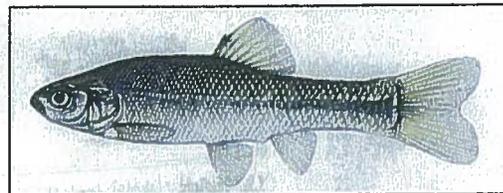
COMMON NAME: GIZZARD SHAD
OTHER NAMES: SHAD
SCIENTIFIC NAME: *Dorosoma cepedianum*



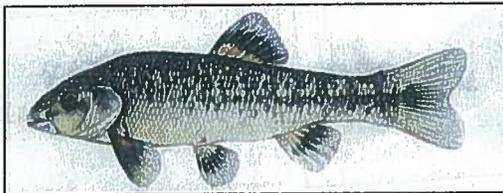
COMMON NAME: BLUNTNOSE MINNOW
OTHER NAMES: NONE
SCIENTIFIC NAME: *Pimephales notatus*



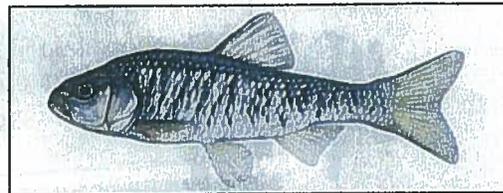
COMMON NAME: CREEK CHUB
OTHER NAMES: COMMON CHUB
SCIENTIFIC NAME: *Semotilus atromaculatus*



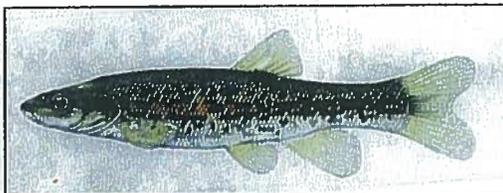
COMMON NAME: FATHEAD MINNOW
OTHER NAMES: NONE
SCIENTIFIC NAME: *Pimephales promelas*



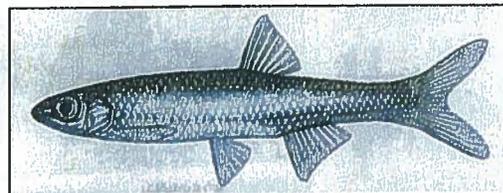
COMMON NAME: CENTRAL STONEROLLER
OTHER NAMES: NONE
SCIENTIFIC NAME: *Campostoma anomalum*



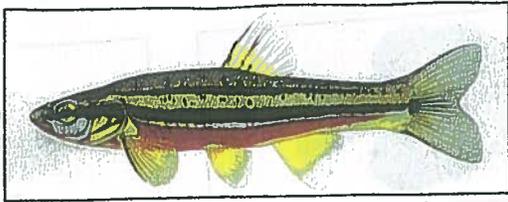
COMMON NAME: STRIPED SHINER
OTHER NAMES: NONE
SCIENTIFIC NAME: *Luxilus chrysocephalus*



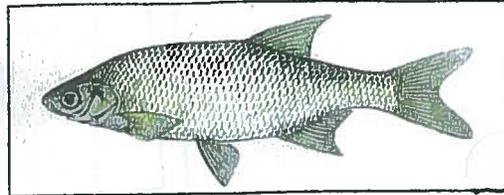
COMMON NAME: BLACKNOSE DACE
OTHER NAMES: NONE
SCIENTIFIC NAME: *Rhinichthys atratulus*



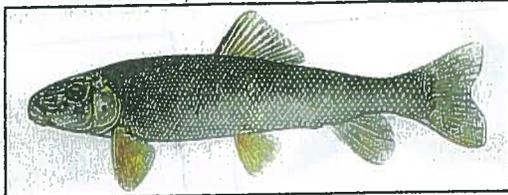
COMMON NAME: EMERALD SHINER
OTHER NAMES: LAKE SHINER
SCIENTIFIC NAME: *Notropis atherinoides*



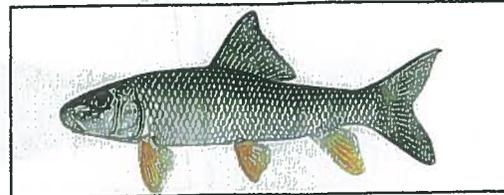
COMMON NAME: SOUTHERN REDBELLY DACE
OTHER NAMES: NONE
SCIENTIFIC NAME: *Phoxinus erythrogaster*



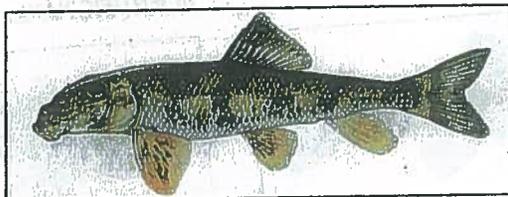
COMMON NAME: GOLDEN SHINER
OTHER NAMES: SHINER
SCIENTIFIC NAME: *Notemigonus crysoleucas*



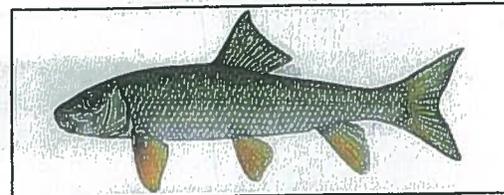
COMMON NAME: WHITE SUCKER
OTHER NAMES: GRAY SUCKER
SCIENTIFIC NAME: *Catostomus commersoni*



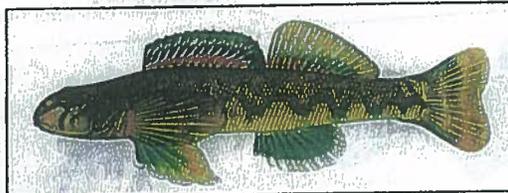
COMMON NAME: GOLDEN REDHORSE
OTHER NAMES: NONE
SCIENTIFIC NAME: *Moxostoma erythrurum*



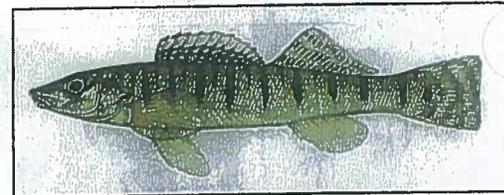
COMMON NAME: NORTHERN HOG SUCKER
OTHER NAMES: NONE
SCIENTIFIC NAME: *Hypentelium nigricans*



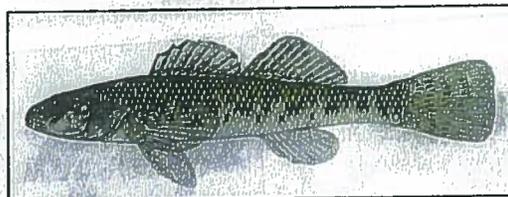
COMMON NAME: BLACK REDHORSE
OTHER NAMES: NONE
SCIENTIFIC NAME: *Moxostoma duquesnei*



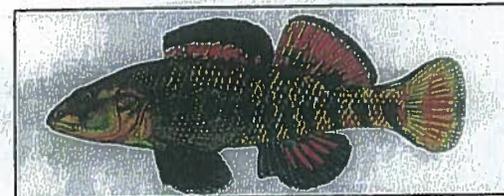
COMMON NAME: GREENSIDE DARTER
OTHER NAMES: NONE
SCIENTIFIC NAME: *Etheostoma blennioides*



COMMON NAME: LOGPERCH DARTER
OTHER NAMES: NONE
SCIENTIFIC NAME: *Percina caprodes*

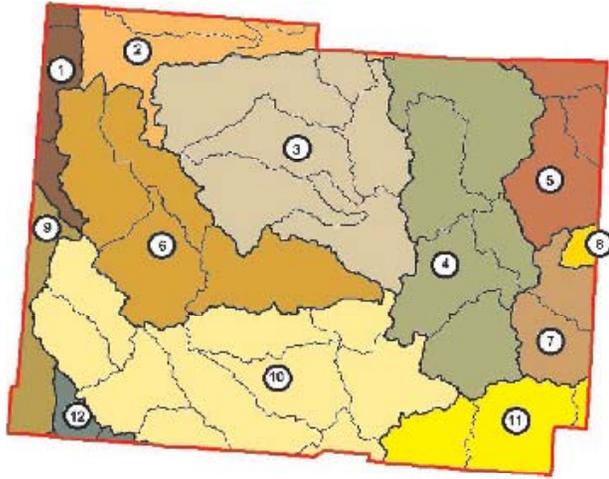


COMMON NAME: JOHNNY DARTER
OTHER NAMES: NONE
SCIENTIFIC NAME: *Etheostoma nigrum*



COMMON NAME: RAINBOW DARTER
OTHER NAMES: NONE
SCIENTIFIC NAME: *Etheostoma caeruleum*

LICKING COUNTY WATERSHEDS...



WHAT'S YOUR WATERSHED?

Find the watershed where you live on the map. The darker lines delineate Licking County's larger watersheds. The lighter lines identify smaller watersheds within each grouping.

- (1) Big Walnut Creek -- headwaters to Hoover Dam
- (2) North Fork of Licking River -- headwaters below Sycamore Creek
- (3) North Fork of Licking River -- below Sycamore Creek to Licking River
- (4) Licking River -- below confluence of North and South Forks to below Rocky Fork
- (5) Wakatomika Creek -- headwaters to Brushy Fork
- (6) Raccoon Creek
- (7) Licking River below Rocky Fork to Muskingum River
- (8) Wakatomika Creek -- below Brushy Fork to Muskingum River
- (9) Big Walnut Creek -- below Hoover Dam to Alum Creek
- (10) South Fork of Licking River
- (11) Jonathan Creek
- (12) Walnut Creek -- headwaters to Sycamore Creek

LICKING COUNTY NPDES PHASE II COMMUNITIES

IN COOPERATION WITH THE LICKING COUNTY SOIL &
WATER CONSERVATION DISTRICT

Licking County

Village of Buckeye Lake	Licking Township
Village of Granville	Madison Township
Village of Hebron	Newark Township
Etna Township	Newton Township
Granville Township	Union Township

Call Licking County SWCD at 670-5330
for more information.



Phone: 740-670-5330 * www.lickingswcd.com

I LIVE IN A WATERSHED?



A Citizen's Guide to Clean Water

A WATERSHED IS....

A watershed is an area of land that drains to a stream, river or lake. During rainfall events, some rainwater soaks into the ground. The rest of this rainwater runs along the surface of the ground until it collects in a low area (usually a river, stream or lake.) The water that runs along the surface of the ground is called runoff. As the runoff travels over the ground's surface, it collects sediment, chemicals, litter and other pollutants and carries them to our waterways.



Each watershed is unique. Every watershed has its own mix of natural and human-made features. Watersheds are powered by gravity. Hills and ridges form boundaries from which water drains into or away from watersheds. Water drains from higher slopes and collects in the lowest points – rivers, streams and lakes.

Watersheds can be large or small. They can encompass a few acres around a small country stream or all of the states surrounding a large river. Smaller watersheds are part of larger watersheds. The Licking River watershed is part of the Muskingum River watershed which is part of the Ohio River watershed.

WHY SHOULD I CARE ABOUT WATERSHEDS?

Everyone lives in a watershed. Every moment of every day you are in a watershed. Everyone's actions impact our water quality.

Watersheds provide water for human consumption, industry, agriculture and recreation. Many animals make their home in water. Other wildlife use our rivers, streams and lakes as their source for drinking water. Do you know the source of your drinking water?



TYPES OF POLLUTION...

Most people think water pollution comes from a factory dumping directly into the water or a chemical spill. This type of pollution is called Point Source Pollution. We can easily trace the source of this type of pollution. Point Source Pollution is combated with laws and regulatory agencies. These laws and agencies have done a good job of curbing Point Source Pollution and preventing future issues.

One of the major problems facing our waterways is Non-Point Source Pollution. This type of pollution comes from a variety of sources over a wide area. These pollutants are carried into our waterways by runoff. Non-Point Source Pollutants include sediment, lawn chemicals, litter, oil, household hazardous wastes and many other items found in and around your home. The best way to combat Non-Point Source Pollution is educating citizens on simple, cost effective measures they can implement to prevent water pollution.

WHAT CAN I DO?

Following are some steps you can take to help keep our water clean.

Don't Litter - Litter often makes its way into our rivers, streams and lakes. It can harm wildlife and increase pest populations. It is also illegal.

Recycle Used Motor Oil - Most instant oil change stores will take your used motor oil for recycling. Never pour oil down the drain or on the ground. One quart of oil can contaminate two million gallons of water.

Use Lawn Chemicals Responsibly - Always follow lawn chemical directions. Do not apply more chemicals than needed. Pay attention to the weather. Do not apply chemicals when rain is likely. Consider using natural fertilizers and pest controls.

Take Chemicals to Household Hazardous Waste Collections - Your home contains many hazardous wastes including batteries, cleaning solutions, pool chemicals and others. These items can cause water pollution when disposed of improperly. Never pour household hazardous wastes down the drain or throw them in the garbage. Take them to household hazardous waste collection days. Try not to buy more of a household chemical than you will use.

Clean-up Pet Waste - Dispose of pet wastes in the toilet or garbage. These wastes contain nutrients and pathogens that can contaminate our waterways.

Don't Dump in Storm Drains - Storm drains often drain directly into a creek or river without any treatment. Anything poured down these drains becomes part of these waterways.

Maintain Your Septic System - Leaking or improperly functioning septic systems can cause water pollution. Having septic systems inspected or pumped every 3 to 5 years can help prevent water pollution. This maintenance can also improve the function of your septic system.



MSDS

P.O. Box 329 - 802 Washington Avenue Chestertown, MD 21620 - USA

MATERIAL SAFETY DATA SHEET

TELEPHONE # FOR INFORMATION 410 778-3100

24 HOUR EMERGENCY NUMBER (CHEM-TEL): USA, Canada, Puerto Rico 800-255-3924;

Outside North American Continent 813-248-0585 (call Collect)

1. Product Identification

Product Code: 4880

Product Description: Coliform Tablet

Manufactured By: LaMotte Company

802 Washington Avenue

Chestertown, MD 21620

2. Composition/Information On Ingredients

Hazard CAS#/Name	%	PEL	TLV
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All ingredients are proprietary to the LaMotte Company, registered under the State of New Jersey Trade Secret Protection Law, assigned the NJ Trade Secret Registry # 80100291-5060p, and may be disclosed only in a medical emergency.

3. Hazards Overview

Primary Route Of Entry: Ingestion

HMIS Hazard

Scale: 4 = Extreme, 3 = High, 2 = Moderate, 1 = Slight, 0 = Least

Health: 0 Flammability: 0 Reactivity: 0

Carcinogenicity: None:

Other Health Related Comments:

Tablet is not hazardous. Contains no carcinogenic, toxic, or hazardous ingredients.

4. First Aid Measures

Eye Contact: Flush with water and under eyelids.

Skin Contact: Flush with water. Wash with soap and water.

Ingestion: Tablets contain no toxic chemicals, but are not for human consumption. Drink water & consult doctor if more than a few have been swallowed.

Inhalation: Remove to fresh air.

Product Code: 4880

Product Description: Coliform Tablet

5. Fire Fighting Measures

Flash Point (Method Used): N/A

LEL: N/A

UEL: N/A

Extinguishing Media: Not a fire hazard

Special Fire Fighting Procedures: N/A

Unusual Fire & Explosion Hazard: N/A

6. Accidental Release Measures

Sweep up and discard to trash. Dispose according to federal, state, and local regulations.

7. Handling & Storage

Store in cool, dry place.

8. Exposure Controls/Personal Protection

Ventilation

Normal

Protection When Handling

N/A

Work/Hygenic Practices:

Product Code: 4880

Product Description: Coliform Tablet

9. Physical & Chemical Properties

Appearance: Tan Tablet

Solubility In Water: Soluble

Odor: None

pH: 7 (1 tablet in 10mL water)

Vapor Density: N/A

Vapor Pressure: N/A

Boiling Point: N/A

Melting Point: Unknown

10. Stability & Reactivity

Stable: Yes

Conditions To Avoid: Heat, moisture

Incompatibility (Materials To Avoid): N/A

Hazardous Decomposition Products: N/A

11. Toxicological Information

Non-toxic, non-hazardous

Target Organs: N/A

12. Ecological Information

Information Not Yet Available

13. Disposal Considerations

Dispose according to federal, state and local regulations. If regulations permit, dissolve in water and rinse to drain with excess water. Small quantities of less than 100 tablets may be discarded to ordinary trash.

14. Transportation Information

Not Regulated For Transport

Product Code: 4880

Product Description: Coliform Tablet

15. Regulatory Information

Chemical Inventory Status

Hazard	Ingredient	USA TSCA	Europe EC	--- Canada --- DSL NDSL		Australia	Japan
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Federal, State, & International Regulations

Ingredient	--- SARA 302 ---		----- SARA 313 -----		CERCLA	RCRA 261.33	TSCA 8(D)
	RQ	TPQ	Listed	Chemical Category			

Product Code: 4880

Product Description: Coliform Tablet

--- SARA 311/312 ---
Hazard Categories

----- Australia -----
Hazchem Poison
Code Schedule

This MSDS Is
WHMIS Compliant

Ingredient	Acute	Chronic	Fire	Pressure	Reactivity	Hazchem Code	Poison Schedule	This MSDS Is WHMIS Compliant
product 4880 as a whole	No	No	No	No	No	None Allocated	None Allocated	Yes

16. Other Information

Prepared By: Regulatory Affairs Department

Revised: 3/17/2010



Issuing Date 10/20/2010

Revision Number 0

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name Dissolved Oxygen Test Tablet
Product Code(s) 3976
Synonyms none / ninguno / aucun
Recommended Use Laboratory chemicals.
Company LaMotte Company, Inc.
802 Washington Avenue
P.O. Box 329
Chestertown, MD 21620
USA
Emergency Telephone Number 24 Hour Emergency Number (CHEM-TEL):
USA, Canada, Puerto Rico 1-800-255-3924
Outside North American Continent (Call collect) 813-248-0585

2. HAZARDS IDENTIFICATION

Emergency Overview

Harmful if swallowed
May stain skin

Appearance Gray

Physical State Solid, Tablet

Odor Odorless

OSHA Regulatory Status This product is an article which contains a chemical substance. Safety information is given for exposure to the article as sold, but considers exposure to the chemical if user has direct eye and skin contact with the chemical.

Potential Health Effects
Principle Routes of Exposure Skin contact, Inhalation

Acute Toxicity
Eyes May cause irritation.
Skin May cause irritation.
Inhalation May cause irritation of respiratory tract.
Ingestion Harmful if swallowed.

Chronic Effects
Aggravated Medical Conditions None known.

Interactions with Other Chemicals None known.

Environmental Hazard No information available.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Weight %
2,4-Diaminophenol dihydrochloride	137-09-7	0.1
Sodium citrate, dihydrate	6132-04-3	25

Excipients	0-0-0000	to 100
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Ingredients not listed by name are proprietary to LaMotte Company, registered under the State of New Jersey Trade Secret Protection Law, assigned the NJ Trade Secret Registry # 80100291-5036p, and may be disclosed only in a medical emergency.

4. FIRST AID MEASURES

General Advice	Do not get in eyes, on skin, or on clothing.
Eye Contact	Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.
Skin Contact	Wash off immediately with soap and plenty of water for at least 15 minutes while removing all contaminated clothing and shoes. If irritation develops or persists, consult physician.
Inhalation	Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration and contact emergency personnel.
Ingestion	Drink plenty of water. Clean mouth with water. Never give anything by mouth to an unconscious person. Consult a physician. If more than a few tablets have been swallowed, induce vomiting and contact physician.
Protection of First-aiders	Use personal protective equipment. See Section 8 for more detail. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

5. FIRE-FIGHTING MEASURES

Flammable Properties	Not a fire hazard.
Suitable Extinguishing Media	Water spray, dry chemical, carbon dioxide (CO ₂), or foam.

Explosion Data

NFPA	Health Hazard 1	Flammability 0	Stability 0	Physical and Chemical Hazards N/A
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6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	Refer to Section 8.
Methods for Cleaning Up	Sweep up and shovel into suitable containers for disposal. Keep in suitable and closed containers for disposal. If local regulations permits small amounts (<50 tablets), dissolve and rinse to drain with excess water.

7. HANDLING AND STORAGE

Handling	Handle in accordance with good industrial hygiene and safety practice. Prevent contact with skin, eyes and clothing. Do not ingest. Do not eat, drink or smoke when using this product.
Storage	Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, moisture, and incompatibles.. Keep out of the reach of children.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
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2,4-Diaminophenol dihydrochloride 137-09-7	None Known	None Known	None Known
Sodium citrate, dihydrate 6132-04-3	None Known	None Known	None Known
Excipients 0-0-0000	None Known	None Known	None Known

Personal Protective Equipment**Eye/Face Protection**

Safety glasses with side-shields. Avoid contact with eyes.

Skin and Body Protection

Gloves & Lab Coat.

Respiratory Protection

None required under normal usage.

Hygiene Measures

Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes and clothing. Wear suitable gloves and eye/face protection. Wash hands and face before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Gray	Odor	Odorless
Physical State	Solid, Tablet	pH	8 (2 tablets in 4.8mL of water)
Freezing Point	No information available		
Explosion Limits	Not applicable		
Molecular Weight	No data available	Water Solubility	Soluble in water

10. STABILITY AND REACTIVITY

Stability	Stable.
Incompatible Products	None known based on information supplied.
Conditions to Avoid	Exposure to air or moisture over prolonged periods. Excessive heat.
Hazardous Decomposition Products	None under normal use.
Hazardous Reactions	Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
2,4-Diaminophenol dihydrochloride	240 mg/kg (Rat)	None Known	None Known
Sodium citrate, dihydrate	None Known	None Known	None Known
Excipients	None Known	None Known	None Known

Chronic Toxicity

Chemical Name	ACGIH	IARC	NTP	OSHA
2,4-Diaminophenol dihydrochloride	None Known	None Known	None Known	None Known
Sodium citrate, dihydrate	None Known	None Known	None Known	None Known
Excipients	None Known	None Known	None Known	None Known

Chemical Name	EU - Endocrine Disruptors Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information

2,4-Diaminophenol dihydrochloride	None Known	None Known	None Known
Sodium citrate, dihydrate	None Known	None Known	None Known
Excipients	None Known	None Known	None Known

12. ECOLOGICAL INFORMATION

Ecotoxicity

Chemical Name	Toxicity to Algae	Toxicity to Fish	Microtox	Daphnia Magna (Water Flea)
2,4-Diaminophenol dihydrochloride	None Known	None Known	None Known	None Known
Sodium citrate, dihydrate	EC50 1800 - 3200 mg/L 96 h	LC50= 18000 mg/L Poecilia reticulata 96 h	None Known	None Known
Excipients	None Known	None Known	None Known	None Known

Chemical Name	Log Pow
2,4-Diaminophenol dihydrochloride	None Known
Sodium citrate, dihydrate	None Known
Excipients	None Known

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method Dispose of in accordance with local regulations.

Contaminated Packaging Dispose of in accordance with local regulations.

Chemical Name
2,4-Diaminophenol dihydrochloride - 137-09-7
Sodium citrate, dihydrate - 6132-04-3
Excipients - 0-0-0000

Chemical Name	RCRA - Halogenated Organic Compounds	RCRA - P Series Wastes	RCRA - F Series Wastes	RCRA - K Series Wastes
2,4-Diaminophenol dihydrochloride - 137-09-7	None Known	None Known	None Known	None Known
Sodium citrate, dihydrate - 6132-04-3	None Known	None Known	None Known	None Known
Excipients - 0-0-0000	None Known	None Known	None Known	None Known

14. TRANSPORT INFORMATION

DOT Not regulated

IATA Not regulated

IMDG/IMO Not regulated

15. REGULATORY INFORMATION

International Inventories

Component	TSCA	DSL	EINECS/ELINCS	ENCS	IECSC	KECL	PICCS	AICS
2,4-Diaminophenol dihydrochloride 137-09-7 (0.1)	Present	X	X	3-2772	X	KECL	X	X

Sodium citrate, dihydrate 6132-04-3 (25)	TSCA	DSL	EINECS/ELINCS	ENCS	X	KECL	X	X
Excipients 0-0-0000 (to 100)	TSCA	DSL	EINECS/ELINCS	ENCS	IECSC	KECL	PICCS	AICS

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

Chemical Name	CAS-No	Weight %	SARA 313 - Threshold Values %
2,4-Diaminophenol dihydrochloride	137-09-7	0.1	None Known
Sodium citrate, dihydrate	6132-04-3	25	None Known
Excipients	0-0-0000	to 100	None Known

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

Component	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
2,4-Diaminophenol dihydrochloride 137-09-7 (0.1)	None Known	None Known	None Known	None Known
Sodium citrate, dihydrate 6132-04-3 (25)	None Known	None Known	None Known	None Known
Excipients 0-0-0000 (to 100)	None Known	None Known	None Known	None Known

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)

Chemical Name	CAS-No	Weight %	HAPS data	VOC Chemicals	Class 1 Ozone Depletors	Class 2 Ozone Depletors
2,4-Diaminophenol dihydrochloride	137-09-7	0.1	None Known	Group V	None Known	None Known
Sodium citrate, dihydrate	6132-04-3	25	None Known	None Known	None Known	None Known
Excipients	0-0-0000	to 100	None Known	None Known	None Known	None Known

CERCLA

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs
2,4-Diaminophenol dihydrochloride	None Known	None Known
Sodium citrate, dihydrate	None Known	None Known
Excipients	None Known	None Known

U.S. State Regulations

California Proposition 65

This product does not contain any Proposition 65 chemicals

Chemical Name	CAS-No	California Prop. 65
2,4-Diaminophenol dihydrochloride	137-09-7	None Known

Sodium citrate, dihydrate	6132-04-3	None Known
Excipients	0-0-0000	None Known

U.S. State Right-to-Know Regulations

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
2,4-Diaminophenol dihydrochloride	None Known	None Known	None Known	None Known	None Known
Sodium citrate, dihydrate	None Known	None Known	None Known	None Known	None Known
Excipients	None Known	None Known	None Known	None Known	None Known

International Regulations

Mexico - Grade No information available

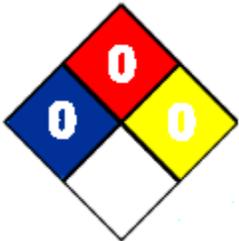
Chemical Name	Carcinogen Status	Exposure Limits
2,4-Diaminophenol dihydrochloride	None Known	None Known
Sodium citrate, dihydrate	None Known	None Known
Excipients	None Known	None Known

Canada

WHMIS Hazard Class

Not subject to WHMIS classification

16. OTHER INFORMATION

NFPA	HMIS	PPE	Transport Symbol						
	<table border="1"> <tr> <td>Health Hazard</td> <td>1</td> </tr> <tr> <td>Fire Hazard</td> <td>0</td> </tr> <tr> <td>Reactivity</td> <td>0</td> </tr> </table>	Health Hazard	1	Fire Hazard	0	Reactivity	0		Not regulated
Health Hazard	1								
Fire Hazard	0								
Reactivity	0								

Prepared By Regulatory Affairs Department

Issuing Date 10/20/2010

Revision Date

Revision Note (M)SDS sections updated. 9.

Disclaimer

The information provided on this MSDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS



MSDS

P.O. Box 329 - 802 Washington Avenue Chestertown, MD 21620 - USA

MATERIAL SAFETY DATA SHEET

TELEPHONE # FOR INFORMATION 410 778-3100

24 HOUR EMERGENCY NUMBER (CHEM-TEL): USA, Canada, Puerto Rico 800-255-3924;

Outside North American Continent 813-248-0585 (call Collect)

1. Product Identification

Product Code: 2799

Product Description: Nitrate #1 Tablet

Manufactured By: LaMotte Company

802 Washington Avenue

Chestertown, MD 21620

2. Composition/Information On Ingredients

Hazard	CAS#/Name	%	PEL	TLV
Yes	5329-14-6 Sulfamic Acid	6	N/E	N/E

*Ingredients not listed by name are proprietary to LaMotte Co, registered under the state of New Jersey (U.S.A.) trade secret protection law, assigned the NJ Trade Secret Registry # 80100291-5011p and may be disclosed only in a medical emergency.

3. Hazards Overview

Primary Route Of Entry: Skin Ingestion

May be irritating to skin. May be harmful if swallowed.

HMIS Hazard

Scale: 4 = Extreme, 3 = High, 2 = Moderate, 1 = Slight, 0 = Least

Health: 1 Flammability: 0 Reactivity: 0

Carcinogenicity: None:

Other Health Related Comments:

See Section 11, Toxicity

Product Code: 2799

Product Description: Nitrate #1 Tablet

4. First Aid Measures

Eye Contact: Flush with water for 15 minutes. Consult physician if eye appears irritated.

Skin Contact: Flush skin thoroughly with water. Wash with soap and water.

Ingestion: Drink plenty of water. Consult physician if more than a few have been swallowed or if signs of mouth or throat irritation develop.

Inhalation: Remove to fresh air.

5. Fire Fighting Measures

Flash Point (Method Used): N/A

LEL: N/A

UEL: N/A

Extinguishing Media: Not a fire hazard

Special Fire Fighting Procedures: N/A

Unusual Fire & Explosion Hazard: N/A

6. Accidental Release Measures

Wear gloves & eye protection. Sweep up and dissolve in water. Wash down drain with excess water.

7. Handling & Storage

Store in cool, dry place, out of reach of young children.

8. Exposure Controls/Personal Protection

Ventilation

Normal

Protection When Handling

Eye Protection Lab Coat

Work/Hygenic Practices: Avoid handling tablets. Wash hands after handling.

9. Physical & Chemical Properties

Appearance: Small White Tablet

Solubility In Water: Soluble

Odor: None

pH: 2 (1 tablet in 10mL water)

Vapor Density: N/A

Vapor Pressure: N/A

Boiling Point: N/A

Melting Point: Unknown

10. Stability & Reactivity

Stable: Yes

Conditions To Avoid: Moisture

Incompatibility (Materials To Avoid): N/A

Hazardous Decomposition Products: SO_x

11. Toxicological Information

Oral rat LD50: 3160 mg/kg for sulfamic acid. Tablets are acidic in water (pH 2) and will irritate mouth, throat, and esophagus if many are swallowed.

Target Organs: Skin

Product Code: 2799

Product Description: Nitrate #1 Tablet

12. Ecological Information

Information Not Yet Available

13. Disposal Considerations

Dispose according to federal, state and local regulations.

14. Transportation Information

Not Regulated For Transport

15. Regulatory Information

Chemical Inventory Status

Hazard	Ingredient	USA TSCA	Europe EC	--- Canada --- DSL NDSL		Australia	Japan
Yes	5329-14-6	Yes	Yes	Yes	No	Yes	Yes

Federal, State, & International Regulations

Ingredient	--- SARA 302 ---		----- SARA 313 -----		CERCLA	RCRA 261.33	TSCA 8(D)
	RQ	TPQ	Listed	Chemical Category			
5329-14-6 Sulfamic Acid	No	No	No	No	No	No	No

Product Code: 2799

Product Description: Nitrate #1 Tablet

--- SARA 311/312 ---

Hazard Categories

----- Australia -----

**Hazchem
Code**

**Poison
Schedule**

**This MSDS Is
WHMIS Compliant**

Ingredient	Acute	Chronic	Fire	Pressure	Reactivity
5329-14-6 Sulfamic Acid	Yes	No	No	No	No

2T

S6

**product 2799
as a whole**

No	No	No	No	No	No	None Allocated	None Allocated	Yes
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16. Other Information

Australia: This product is not classified as a hazardous substance according to the criteria of ASCC (based on a risk assessment according to ASCC/NOHSC criteria.

Prepared By: IP, Regulatory Affairs Department

Revised: 11/29/2007



MSDS

P.O. Box 329 - 802 Washington Avenue Chestertown, MD 21620 - USA

MATERIAL SAFETY DATA SHEET

TELEPHONE # FOR INFORMATION 410 778-3100

24 HOUR EMERGENCY NUMBER (CHEM-TEL): USA, Canada, Puerto Rico 800-255-3924;

Outside North American Continent 813-248-0585 (call Collect)

1. Product Identification

Product Code: NN-3703

Product Description: Nitrate #2 CTA tablets

Manufactured By: LaMotte Company

802 Washington Avenue

Chestertown, MD 21620

2. Composition/Information On Ingredients

Hazard	CAS#/Name	%	PEL	TLV
Yes	7440-66-6 Zinc Dust	1	N/E	10 mg/cubic m, ZnO fume

All other ingredients are proprietary NJTSRN 80100291-5067p

*Ingredients not listed by name are proprietary to LaMotte Co, registered under the state of New Jersey (U.S.A.) trade secret protection law, assigned the NJ Trade Secret Registry # 80100291-5067p and may be disclosed only in a medical emergency.

3. Hazards Overview

Primary Route Of Entry: Ingestion

May be harmful if swallowed.

HMIS Hazard

Scale: 4 = Extreme, 3 = High, 2 = Moderate, 1 = Slight, 0 = Least

Health: 1 Flammability: 0 Reactivity: 0

Carcinogenicity: None

Other Health Related Comments:

Product Code: NN-3703

Product Description: Nitrate #2 CTA tablets

4. First Aid Measures

Eye Contact: Flush with water for 15 minutes. Consult a physician.

Skin Contact: Flush with water. Wash with soap and water.

Ingestion: Induce vomiting. Give plenty of water. Consult a physician.

Inhalation: N/A

5. Fire Fighting Measures

Flash Point (Method Used): N/A

LEL: N/A

UEL: N/A

Extinguishing Media: Not a fire hazard

Special Fire Fighting Procedures: N/A

Unusual Fire & Explosion Hazard: N/A

6. Accidental Release Measures

Sweep up, dissolve in water. Wash down drain with excess water.

7. Handling & Storage

Store cool, dry, away from heat and moisture

8. Exposure Controls/Personal Protection

Ventilation

Normal

Protection When Handling

Gloves Eye Protection Lab Coat

Work/Hygenic Practices: Avoid handling tablets.

9. Physical & Chemical Properties

Appearance: Small Gray Tablet

Solubility In Water: Soluble

Odor: None

pH: 3 (1 tablet in 5mL water)

Vapor Density: N/A

Vapor Pressure: N/A

Boiling Point: Unknown

Melting Point: Unknown

10. Stability & Reactivity

Stable: Yes

Conditions To Avoid: Heat, moisture

Incompatibility (Materials To Avoid): Contact with nitric acid or other strong oxidizers

Hazardous Decomposition Products: CO_x, NO_x, SO_x

11. Toxicological Information

Target Organs: N/A

Product Code: NN-3703

Product Description: Nitrate #2 CTA tablets

12. Ecological Information

Information Not Yet Available

13. Disposal Considerations

Dissolve in water. Wash down drain with excess water. Dispose according to federal, state and local regulations.

14. Transportation Information

Not Regulated For Transport

15. Regulatory Information

Chemical Inventory Status

Hazard	Ingredient	USA TSCA	Europe EC	--- Canada --- DSL NDSL		Australia	Japan
Yes	7440-66-6	Yes	Yes	Yes	No	Yes	No

Federal, State, & International Regulations

Ingredient	--- SARA 302 ---		----- SARA 313 -----		CERCLA	RCRA 261.33	TSCA 8(D)
	RQ	TPQ	Listed	Chemical Category			
7440-66-6 Zinc Dust	No	No	Yes	No	1000	No	No

Product Code: NN-3703

Product Description: Nitrate #2 CTA tablets

--- SARA 311/312 ---

Hazard Categories

----- Australia -----

**Hazchem
Code**

**Poison
Schedule**

**This MSDS Is
WHMIS Compliant**

Ingredient	Acute	Chronic	Fire	Pressure	Reactivity
7440-66-6 Zinc Dust	Yes	No	Yes	No	Yes

4Y

S6

product NN-3703 as a whole	Yes	No	No	No	No	None Allocated	None Allocated	Yes
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16. Other Information

Prepared By: IP, Regulatory Affairs Department

Revised: 11/29/2007



Issuing Date 12/13/2010

Revision Number 0

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name Wide Range pH Tablets
Product Code(s) 6459
Synonyms none
Recommended Use Test kit reagent. Industrial (not for food or food contact use).
Company LaMotte Company, Inc.
802 Washington Avenue
P.O. Box 329
Chestertown, MD 21620
USA
Emergency Telephone Number 24 Hour Emergency Number (CHEM-TEL):
USA, Canada, Puerto Rico 1-800-255-3924
Outside North American Continent (Call collect) 813-248-0585

2. HAZARDS IDENTIFICATION

Emergency Overview

The product contains no substances which in their current physical state are considered to be hazardous to health
Keep out of the reach of children

Appearance brown-gray

Physical State Tablet

Odor None

OSHA Regulatory Status While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this MSDS contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

Potential Health Effects

Acute Toxicity

Chronic Effects

Product does not present a chronic toxicity hazard based on known or supplied information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula proprietary

Chemical Name	CAS-No	Weight %
Methyl red	493-52-7	<0.1
Bromothymol blue	76-59-5	<0.1
Cresol red	1733-12-6	<0.1
Phenolphthalein, disodium salt	518-51-4	<0.5
Excipients	0-0-0000	>99

Ingredients not listed by name are proprietary to LaMotte Company, registered under the State of New Jersey Trade Secret Protection Law, assigned the NJ Trade Secret Registry # 80100291-5024p, and may be disclosed only in a medical emergency.

4. FIRST AID MEASURES

General Advice	No hazards which require special first aid measures. Do not get in eyes, on skin, or on clothing. Keep out of reach of children.
Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If irritation persists or develops, contact a physician.
Skin Contact	Wash off with soap and plenty of water removing all contaminated clothes and shoes. If irritation develops or persists, consult physician.
Inhalation	Move to fresh air. Not an expected route of exposure.
Ingestion	DO NOT INDUCE VOMITING. Drink plenty of water. Consult a physician.
Protection of First-aiders	Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

5. FIRE-FIGHTING MEASURES

Flammable Properties	Not a fire hazard.
Flash Point	Not applicable
Suitable Extinguishing Media	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Dry chemical, CO ₂ , water spray or alcohol-resistant foam.

Explosion Data

NFPA	Health Hazard 0	Flammability 0	Stability 0	Physical and Chemical Hazards -
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6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	Avoid contact with skin, eyes and clothing.
Methods for Cleaning Up	Sweep up and shovel into suitable containers for disposal. If local regulations permit, dissolve and rinse to drain with excess water. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling	Avoid contact with skin, eyes and clothing. Handle in accordance with good industrial hygiene and safety practice. Do not ingest. Do not eat, drink or smoke when using this product.
Storage	Keep container tightly closed in a dry and well-ventilated place. Keep away from heat. Protect from moisture. Keep out of the reach of children.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Methyl red 493-52-7	None Known	None Known	None Known
Bromothymol blue 76-59-5	None Known	None Known	None Known
Cresol red 1733-12-6	None Known	None Known	None Known
Phenolphthalein, disodium salt 518-51-4	None Known	None Known	None Known
Excipients 0-0-0000	None Known	None Known	None Known

Personal Protective Equipment**Eye/Face Protection** Safety glasses with side-shields.**Skin and Body Protection** Protective gloves.**9. PHYSICAL AND CHEMICAL PROPERTIES**

Appearance	brown-gray	Odor	None
Physical State	Tablet	pH	6 (1 tablet in 10mL of water)
Flash Point	Not applicable	Boiling Point/Range	No information available

Vapor Pressure	No information available	Vapor Density	No information available
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10. STABILITY AND REACTIVITY

Stability Stable.

Incompatible Products None known based on information supplied.

Conditions to Avoid Excessive heat. Moisture.

Hazardous Decomposition Products None under normal use.

11. TOXICOLOGICAL INFORMATION**Acute Toxicity****Product Information** Product does not present an acute toxicity hazard based on known or supplied information.

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Methyl red	None Known	None Known	None Known
Bromothymol blue	None Known	None Known	None Known
Cresol red	None Known	None Known	None Known
Phenolphthalein, disodium salt	None Known	None Known	None Known
Excipients	None Known	None Known	None Known

Chronic Toxicity**Chronic Toxicity** Product does not present a chronic toxicity hazard based on known or supplied information.**Carcinogenicity** Contains no ingredient listed as a carcinogen.

Chemical Name	ACGIH	IARC	NTP	OSHA
Methyl red	None Known	None Known	None Known	None Known
Bromothymol blue	None Known	None Known	None Known	None Known
Cresol red	None Known	None Known	None Known	None Known
Phenolphthalein, disodium salt	None Known	None Known	None Known	None Known
Excipients	None Known	None Known	None Known	None Known

Chemical Name	EU - Endocrine Disruptors Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Methyl red	None Known	None Known	None Known
Bromothymol blue	None Known	None Known	None Known
Cresol red	None Known	None Known	None Known

Phenolphthalein, disodium salt	None Known	None Known	None Known
Excipients	None Known	None Known	None Known

12. ECOLOGICAL INFORMATION

Ecotoxicity

Contains no substances known to be hazardous to the environment or not degradable in waste water treatment plants.

Chemical Name	Toxicity to Algae	Toxicity to Fish	Microtox	Daphnia Magna (Water Flea)
Methyl red	None Known	None Known	None Known	None Known
Bromothymol blue	None Known	None Known	None Known	None Known
Cresol red	None Known	None Known	None Known	None Known
Phenolphthalein, disodium salt	None Known	None Known	None Known	None Known
Excipients	None Known	None Known	None Known	None Known

Chemical Name	Log Pow
Methyl red	None Known
Bromothymol blue	None Known
Cresol red	None Known
Phenolphthalein, disodium salt	None Known
Excipients	None Known

13. DISPOSAL CONSIDERATIONS

Chemical Name
Methyl red - 493-52-7
Bromothymol blue - 76-59-5
Cresol red - 1733-12-6
Phenolphthalein, disodium salt - 518-51-4
Excipients - 0-0-0000

Chemical Name	RCRA - Halogenated Organic Compounds	RCRA - P Series Wastes	RCRA - F Series Wastes	RCRA - K Series Wastes
Methyl red - 493-52-7	None Known	None Known	None Known	None Known
Bromothymol blue - 76-59-5	None Known	None Known	None Known	None Known
Cresol red - 1733-12-6	None Known	None Known	None Known	None Known
Phenolphthalein, disodium salt - 518-51-4	None Known	None Known	None Known	None Known
Excipients - 0-0-0000	None Known	None Known	None Known	None Known

14. TRANSPORT INFORMATION

DOT Not regulated

IATA Not regulated

IMDG/IMO Not regulated

15. REGULATORY INFORMATION

International Inventories

Component	TSCA	DSL	EINECS/ELINCS	ENCS	IECSC	KECL	PICCS	AICS
Methyl red 493-52-7 (<0.1)	Present	X	X	5-243	X	KE-06693	X	X

Bromothymol blue 76-59-5 (<0.1)	Present	X	X	ENCS	X	KE-02744	X	X
Cresol red 1733-12-6 (<0.1)	Present	X	X	ENCS	X	KECL	X	X
Phenolphthalein, disodium salt 518-51-4 (<0.5)	Present	X	X	ENCS	IECSC	KECL	PICCS	AICS
Excipients 0-0-0000 (>99)	TSCA	DSL	EINECS/ELIN CS	ENCS	IECSC	KECL	PICCS	AICS

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

Chemical Name	CAS-No	Weight %	SARA 313 - Threshold Values %
Methyl red	493-52-7	<0.1	None Known
Bromothymol blue	76-59-5	<0.1	None Known
Cresol red	1733-12-6	<0.1	None Known
Phenolphthalein, disodium salt	518-51-4	<0.5	None Known
Excipients	0-0-0000	>99	None Known

SARA 311/312 Hazard Categories

Acute Health Hazard	No
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Methyl red 493-52-7 (<0.1)	None Known	None Known	None Known	None Known
Bromothymol blue 76-59-5 (<0.1)	None Known	None Known	None Known	None Known
Cresol red 1733-12-6 (<0.1)	None Known	None Known	None Known	None Known
Phenolphthalein, disodium salt 518-51-4 (<0.5)	None Known	None Known	None Known	None Known
Excipients 0-0-0000 (>99)	None Known	None Known	None Known	None Known

Chemical Name	CAS-No	Weight %	HAPS data	VOC Chemicals	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Methyl red	493-52-7	<0.1	None Known	None Known	None Known	None Known
Bromothymol blue	76-59-5	<0.1	None Known	None Known	None Known	None Known
Cresol red	1733-12-6	<0.1	None Known	None Known	None Known	None Known
Phenolphthalein, disodium salt	518-51-4	<0.5	None Known	None Known	None Known	None Known
Excipients	0-0-0000	>99	None Known	None Known	None Known	None Known

CERCLA

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs
Methyl red	None Known	None Known
Bromothymol blue	None Known	None Known
Cresol red	None Known	None Known
Phenolphthalein, disodium salt	None Known	None Known
Excipients	None Known	None Known

U.S. State Regulations**California Proposition 65**

This product does not contain any Proposition 65 chemicals

Chemical Name	CAS-No	California Prop. 65
Methyl red	493-52-7	None Known
Bromothymol blue	76-59-5	None Known
Cresol red	1733-12-6	None Known
Phenolphthalein, disodium salt	518-51-4	None Known
Excipients	0-0-0000	None Known

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Methyl red	None Known	None Known	None Known	None Known	None Known
Bromothymol blue	None Known	None Known	None Known	None Known	None Known
Cresol red	None Known	None Known	None Known	None Known	None Known
Phenolphthalein, disodium salt	None Known	None Known	None Known	None Known	None Known
Excipients	None Known	None Known	None Known	None Known	None Known

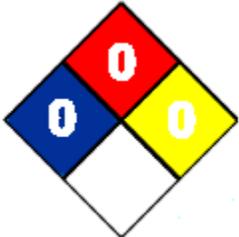
International Regulations**Mexico - Grade**

Chemical Name	Carcinogen Status	Exposure Limits
Methyl red	None Known	None Known
Bromothymol blue	None Known	None Known
Cresol red	None Known	None Known
Phenolphthalein, disodium salt	None Known	None Known
Excipients	None Known	None Known

Canada**WHMIS Hazard Class**

Non-controlled

16. OTHER INFORMATION

NFPA	HMIS	PPE	Transport Symbol						
	<table border="1"> <tbody> <tr> <td>Health Hazard</td> <td>1</td> </tr> <tr> <td>Fire Hazard</td> <td>0</td> </tr> <tr> <td>Reactivity</td> <td>0</td> </tr> </tbody> </table>	Health Hazard	1	Fire Hazard	0	Reactivity	0		
Health Hazard	1								
Fire Hazard	0								
Reactivity	0								

Issuing Date 12/13/2010

Revision Date

Revision Note Update to Format.

Disclaimer

The information provided on this MSDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS



Issuing Date 12/3/2010

Revision Number 0

1. PRODUCT AND COMPANY IDENTIFICATION

Product Name Phosphorus Tablets
Product Code(s) 5422
Synonyms none
Recommended Use Test kit reagent.
Company LaMotte Company, Inc.
802 Washington Avenue
P.O. Box 329
Chestertown, MD 21620
USA
Emergency Telephone Number 24 Hour Emergency Number (CHEM-TEL):
USA, Canada, Puerto Rico 1-800-255-3924
Outside North American Continent (Call collect) 813-248-0585

2. HAZARDS IDENTIFICATION

Emergency Overview

The product contains no substances which in their current physical state are considered to be hazardous to health
Keep out of the reach of children

Appearance White

Physical State Tablet

Odor None

OSHA Regulatory Status While this material is not considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200), this MSDS contains valuable information critical to the safe handling and proper use of the product. This MSDS should be retained and available for employees and other users of this product.

Potential Health Effects

Acute Toxicity

Chronic Effects

3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula proprietary

Chemical Name	CAS-No	Weight %
Ammonium molybdate tetrahydrate	12054-85-2	<2
D-Isoascorbic acid	89-65-6	<2
Excipients	0-0-0000	>95

Ingredients not listed by name are proprietary to LaMotte Company, registered under the State of New Jersey Trade Secret Protection Law, assigned the NJ Trade Secret Registry # 80100291-5034p, and may be disclosed only in a medical emergency.

4. FIRST AID MEASURES

General Advice No hazards which require special first aid measures. Repeated or prolonged skin contact may cause allergic reactions with susceptible persons. Keep out of reach of children.

Eye Contact	Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. If irritation persists or develops, contact a physician.
Skin Contact	Wash off with soap and plenty of water removing all contaminated clothes and shoes. If irritation develops or persists, consult physician.
Inhalation	Move to fresh air. Not an expected route of exposure.
Ingestion	DO NOT INDUCE VOMITING. Drink plenty of water. Consult a physician.
Protection of First-aiders	Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

5. FIRE-FIGHTING MEASURES

Flammable Properties	Not a fire hazard.
Flash Point	Not applicable
Suitable Extinguishing Media	Use extinguishing measures that are appropriate to local circumstances and the surrounding environment. Dry chemical, CO ₂ , water spray or alcohol-resistant foam.

Explosion Data

NFPA	Health Hazard 0	Flammability 0	Stability 0	Physical and Chemical Hazards -
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6. ACCIDENTAL RELEASE MEASURES

Personal Precautions	Avoid contact with skin, eyes and clothing.
Methods for Cleaning Up	Sweep up and shovel into suitable containers for disposal. Containerize spill material and hold for later disposal. If local regulations permit, dissolve with large volume of water, neutralize with alkaline material (sodium bicarbonate), then rinse to drain with excess water. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling	Avoid contact with skin, eyes and clothing. Handle in accordance with good industrial hygiene and safety practice. Do not ingest. Do not eat, drink or smoke when using this product.
Storage	Keep container tightly closed in a dry and well-ventilated place. Keep away from heat. Protect from moisture. Keep out of the reach of children.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Ammonium molybdate tetrahydrate 12054-85-2	TWA: 3 mg/m ³ TWA: 10 mg/m ³ TWA: 0.5 mg/m ³	TWA: 15 mg/m ³ TWA: 5 mg/m ³	IDLH: 1000 mg/m ³
D-Isoascorbic acid 89-65-6	None Known	None Known	None Known
Excipients 0-0-0000	None Known	None Known	None Known

Personal Protective Equipment

Eye/Face Protection

Safety glasses with side-shields.

Skin and Body Protection Protective gloves.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	White	Odor	None
Physical State	Tablet	pH	2 (1 tablet in 10mL of water)
Flash Point	Not applicable	Boiling Point/Range	No information available

Vapor Pressure	No information available	Vapor Density	No information available
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10. STABILITY AND REACTIVITY

Stability Stable.

Incompatible Products Acids. Strong reducing agents.

Conditions to Avoid Excessive heat. Moisture.

Hazardous Decomposition Products None under normal use.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity

LD50 Oral VALUE (mg/kg) 333 mg/kg for Ammonium molybdate, anhydrous

Chemical Name	LD50 Oral	LD50 Dermal	LC50 Inhalation
Ammonium molybdate tetrahydrate	None Known	None Known	None Known
D-Isoascorbic acid	18 g/kg (Rat)	None Known	None Known
Excipients	None Known	None Known	None Known

Chronic Toxicity

Chemical Name	ACGIH	IARC	NTP	OSHA
Ammonium molybdate tetrahydrate	A3	None Known	None Known	None Known
D-Isoascorbic acid	None Known	None Known	None Known	None Known
Excipients	None Known	None Known	None Known	None Known

Chemical Name	EU - Endocrine Disruptors Candidate List	EU - Endocrine Disruptors - Evaluated Substances	Japan - Endocrine Disruptor Information
Ammonium molybdate tetrahydrate	None Known	None Known	None Known
D-Isoascorbic acid	None Known	None Known	None Known
Excipients	None Known	None Known	None Known

12. ECOLOGICAL INFORMATION

Ecotoxicity

Chemical Name	Toxicity to Algae	Toxicity to Fish	Microtox	Daphnia Magna (Water Flea)
Ammonium molybdate tetrahydrate	None Known	None Known	None Known	None Known
D-Isoascorbic acid	None Known	None Known	None Known	None Known
Excipients	None Known	None Known	None Known	None Known

Chemical Name	Log Pow

Ammonium molybdate tetrahydrate	None Known
D-Isoascorbic acid	None Known
Excipients	None Known

13. DISPOSAL CONSIDERATIONS

Chemical Name
Ammonium molybdate tetrahydrate - 12054-85-2
D-Isoascorbic acid - 89-65-6
Excipients - 0-0-0000

Chemical Name	RCRA - Halogenated Organic Compounds	RCRA - P Series Wastes	RCRA - F Series Wastes	RCRA - K Series Wastes
Ammonium molybdate tetrahydrate - 12054-85-2	None Known	None Known	None Known	None Known
D-Isoascorbic acid - 89-65-6	None Known	None Known	None Known	None Known
Excipients - 0-0-0000	None Known	None Known	None Known	None Known

14. TRANSPORT INFORMATION

DOT Not regulated

IATA Not regulated

IMDG/IMO Not regulated

15. REGULATORY INFORMATION

International Inventories

Component	TSCA	DSL	EINECS/ELINCS	ENCS	IECSC	KECL	PICCS	AICS
Ammonium molybdate tetrahydrate 12054-85-2 (<2)	TSCA	DSL	EINECS/ELINCS	ENCS	X	KECL	X	X
D-Isoascorbic acid 89-65-6 (<2)	Present	X	X	9-131	X	KE-21807	X	X
Excipients 0-0-0000 (>95)	TSCA	DSL	EINECS/ELINCS	ENCS	IECSC	KECL	PICCS	AICS

U.S. Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372:

Chemical Name	CAS-No	Weight %	SARA 313 - Threshold Values %
Ammonium molybdate tetrahydrate	12054-85-2	<2	1.0
D-Isoascorbic acid	89-65-6	<2	None Known
Excipients	0-0-0000	>95	None Known

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	No
Sudden Release of Pressure Hazard	No
Reactive Hazard	No

Clean Water Act

Component	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Ammonium molybdate tetrahydrate 12054-85-2 (<2)	None Known	None Known	None Known	None Known
D-Isoascorbic acid 89-65-6 (<2)	None Known	None Known	None Known	None Known
Excipients 0-0-0000 (>95)	None Known	None Known	None Known	None Known

Chemical Name	CAS-No	Weight %	HAPS data	VOC Chemicals	Class 1 Ozone Depletors	Class 2 Ozone Depletors
Ammonium molybdate tetrahydrate	12054-85-2	<2	None Known	None Known	None Known	None Known
D-Isoascorbic acid	89-65-6	<2	None Known	None Known	None Known	None Known
Excipients	0-0-0000	>95	None Known	None Known	None Known	None Known

CERCLA

Chemical Name	Hazardous Substances RQs	Extremely Hazardous Substances RQs
Ammonium molybdate tetrahydrate	None Known	None Known
D-Isoascorbic acid	None Known	None Known
Excipients	None Known	None Known

U.S. State Regulations**California Proposition 65**

This product does not contain any Proposition 65 chemicals

Chemical Name	CAS-No	California Prop. 65
Ammonium molybdate tetrahydrate	12054-85-2	None Known
D-Isoascorbic acid	89-65-6	None Known
Excipients	0-0-0000	None Known

Chemical Name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Ammonium molybdate tetrahydrate	None Known	None Known	None Known	None Known	None Known
D-Isoascorbic acid	None Known	None Known	None Known	None Known	None Known
Excipients	None Known	None Known	None Known	None Known	None Known

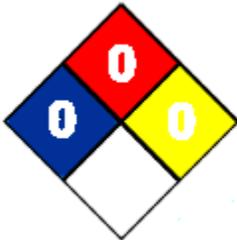
International Regulations**Mexico - Grade**

Chemical Name	Carcinogen Status	Exposure Limits
Ammonium molybdate tetrahydrate	None Known	Mexico: TWA= 10 mg/m ³ Mexico: TWA= 5 mg/m ³
D-Isoascorbic acid	None Known	None Known
Excipients	None Known	None Known

Canada**WHMIS Hazard Class**

Non-controlled

16. OTHER INFORMATION

NFPA	HMIS	PPE	Transport Symbol						
	<table border="1"> <tr> <td data-bbox="509 268 716 306">Health Hazard</td> <td data-bbox="717 268 792 306">1</td> </tr> <tr> <td data-bbox="509 308 716 346">Fire Hazard</td> <td data-bbox="717 308 792 346">0</td> </tr> <tr> <td data-bbox="509 348 716 386">Reactivity</td> <td data-bbox="717 348 792 386">0</td> </tr> </table>	Health Hazard	1	Fire Hazard	0	Reactivity	0		
Health Hazard	1								
Fire Hazard	0								
Reactivity	0								

Issuing Date 12/3/2010

Revision Date

Revision Note Update to Format.

Disclaimer

The information provided on this MSDS is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of MSDS