Whether the problem is

green sediment in ice cubes,

green corrosion on porcelain,

or green dollars spent on water treatments,

THE ILLINOIS STATE WATER SURVEY

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can help find the solution.

The Illinois State Water Survey, a division of the Department of Energy and Natural Resources, is the primary agency concerned with Illinois water—its quality, its quantity, and how it is used. As a state agency, the Water Survey provides tax-supported public services to the people, government agencies, and industries of Illinois.

Among the Water Survey's most important public services are the water analyses provided by its Analytical Chemistry Unit (ACU). Through its Public Service Program the ACU tests water samples and suggests solutions for water problems of all kinds, whether they cause health or economic difficulties, or whether they're simply a nuisance.

How Does the ACU Public Service Program Work for You?

Each year about 1,500 Illinois residents turn to the Water Survey's Analytical Chemistry Unit for help. About half of the ACU's service requests come from private citizens concerned with household water problems. The other requests come from a diverse group made up of industry representatives, well drillers and engineers, farmers, university and institutional administrators, water treatment equipment dealers, government and public health officials, recreational managers, doctors, dentists, and veterinarians.

A homemaker may bring a sample of wash water that has stained the laundry orange. A farmer may bring a sample of livestock water after noting a high death rate among his piglets. A doctor may submit a sample of the tap water to be used by a patient on a low-sodium diet. Or a city official may bring a sample from the municipal water supply to have the fluoride content checked.

The ACU analyzes water samples from household taps, water fountains, wells, rivers, cisterns, drainage tiles, heating and cooling systems, and ponds throughout Illinois. To help solve water problems, the ACU may advise using additives in the water supply, installing a water treatment system, modifying a plumbing system, or contacting a specialist. Referrals are made to scientists at the Water Survey, the University of Illinois, or state or county public health departments.

In some unusual cases, the ACU analysis may not turn up any likely cause for the reported problem. But even this negative information can be useful: if the mineral content is not the cause, Water Survey scientists may recommend additional tests on the water sample and look elsewhere for the solution to the problem. In all cases, the Water Survey and the ACU scientific staff will work with you to identify your water problem and get it solved.

The Water Survey is the only Illinois agency that responds to both public and private concerns about water problems. The Illinois Environmental Protection Agency performs routine water analyses on public supplies to make sure they comply with the law, and the Illinois Department of Public Health determines bacterial and nitrate levels in water. For assistance with broad-spectrum water analyses, both these agencies turn to the Illinois State Water Survey, and you can too.

How Are Water Samples Analyzed?

Water Survey chemists analyze each sample in a different way, depending on where the water came from, how it will be used, and the symptoms of the problem. Although each analysis is individually tailored to the water being tested, most samples are checked for the principal minerals that are likely to be found in typical water samples. This is called a "profile analysis."

Some problems require specialized tests beyond the profile analysis. For example, public water supply analyses usually include extra tests for manganese, which can cause black stains on porcelain, and for fluoride, which is regulated by the Illinois Environmental Protection Agency. Analyses of livestock water include an extra test for sulfates; irrigation water is examined for boron and sulfate; and fish pond samples are tested for copper and ammonium. Some problems may indicate the need to test for toxic metals such as lead, silver, or cadmium.

After your water sample has been analyzed, all the factors that might have caused the problem are evaluated to determine which of them is indeed the culprit. For instance, when the problem is orange stains on laundry, special attention is given to the iron content in the wash water. If piglets are overcome by their drinking water, the analysis will focus on nitrates.

What Does the ACU Water Analysis Really Mean?

Your water analysis can mean many different things, depending on the source of your sample and the purpose for which the water is used. Waters from the same sources are expected to share certain characteristics, and no single type of water is perfect for all purposes. Water from a farm pond should be rich in organic matter, but tap water should not. And the nitrates so valuable in irrigation water could make it harmful to animals and humans. Thus the following questions are always asked as part of your water analysis:

Where did the water come from?

The relationship between the quality of the water in your sample and the qualities that are typical for that type of water is an important factor in solving your water problem. The more details you can supply about the source of the water, the better—including for instance, the geographic location from which your sample was taken, the depth of the well, the date and time of day of sampling, and the owner of the water if known. Complete information about your sample will give scientists valuable clues for a more accurate and timely solution to your problem.

If your water sample came from a river, for example, scientists will expect to find certain qualities typical of river water: it will contain more sediment and fewer minerals than well water, and less fluoride than tap water from a city water supply. If your water sample isn't typical of its source, it could be that the sample was collected or handled improperly—or it could be a valuable clue to the nature of your water problem.

Sometimes, though, you simply can't know the source of the water in your sample. If you collected it from your basement floor, for instance, your problem is finding the source of the water so the problem can be fixed. The ACU mineral analysis can help. In this instance scientists will conduct a fluoride test to determine whether your problem is natural ground-water seepage or a broken municipal water main.

How will the water be used?

Some water is brought to the ACU to determine if it is suitable for a particular use. Water that is just right for one use may cause serious problems elsewhere. For instance, the chlorinated water that is ideal for a swimming pool would kill the fish in an aquarium.

If any potentially dangerous minerals are discovered in your water or if standard minerals could make your water unsuitable for your planned use, Water Survey analysts will advise you about appropriate levels and quality standards. Those standards are set by laws such as the Safe Drinking Water Act. However, only physicians and regulatory agencies can classify water as "safe" or "unsafe" for human consumption.

Strict standards have not been established for irrigation water, livestock water, or water for various industrial purposes. For these uses, Water Survey analysts will consult all available resources to find appropriate water quality standards. This was the case when the ACU was first asked to analyze water for hydroponic gardening some years ago. Very little had been published on the subject at that time, so Water Survey chemists searched out a hydroponics expert in an Illinois agribusiness.

How Do You Submit A Sample to Have Your Water Analyzed?

Water samples must be taken very carefully, using the sample collection kit available from the Water Survey. It includes a sample collection bottle, a refrigerant so that your sample can be kept cool, and complete instructions on how to take the sample for ACU analysis. If the sample is contaminated by other substances as it is being collected, or if the sample is stored inappropriately before it comes to the Water Survey, the resulting water analysis could be inaccurate. Different water problems require different types of analyses, and different types of analyses require different types of samples and collection containers.

The information you supply with your sample and the way in which you submit it are also important for the analysis. Water samples may be delivered in person to the ACU laboratory, or they may be mailed through the U.S. Parcel Service or commercial delivery services. If your sample is mailed, scientists will be concerned about its age and the conditions en route—for instance, whether it was heated or frozen.

For this reason, it is best to *call the ACU laboratory before attempting to collect or submit a sample.* You can speak directly to an analytical chemist who will make sure that you receive a customized sample collection kit appropriate to your water problem. The chemist will give you specific instructions on how to handle your sample and how to submit it. This short discussion will also allow the ACU analyst to become familiar with your problem and make sure that your sample represents the symptoms and is appropriate for the analysis. Samples that are not submitted in the standard sample collection containers cannot be accepted for analysis.

Scientists can occasionally answer questions and recommend solutions to common water problems over the phone. Your initial phone call to the ACU laboratory is the first step toward a fast and accurate solution to your water problem.

What Is The Illinois State Water Survey?

Originally established in 1895 as part of the University of Illinois, the Illinois State Water Survey is now a division of the Illinois Department of Energy and Natural Resources. Its research and service activities are organized under six scientific sections: Aquatic Chemistry, Surface Water, Ground Water, Atmospheric Chemistry, Climate and Meteorology, and Water Quality.

Scientists in each of the sections conduct research, perform public services, and collect data' on ground-water, surface water, and atmospheric water resources in response to the needs of the state and its citizens. Water Survey scientists work with local, state, and federal agencies concerned with water and weather in Illinois.

The Water Survey's scientific and public service efforts contribute to a comprehensive statewide database, an information resource on water and climate that is built on nearly a century of systematically collected information. This resource is available to serve all water-related interests in the nation.

The Analytical Chemistry Unit is the Water Survey's central laboratory, providing support to the research and service programs of the scientific sections. The ACU Public Service Program began in the 1890s with the founding of the Water Survey. At that time, typhoid was sweeping the state, and public and private water samples were analyzed in an effort to pinpoint the sources of the epidemic. The ACU participates in federal quality control programs and is accredited by the Illinois Environmental Protection Agency as a Certified Environmental Laboratory.

The main laboratories and headquarters of the Water Survey are in the Water Survey Research Center on the campus of the University of Illinois at Urbana-Champaign. A second laboratory is located in Peoria, and other facilities and staff are stationed at study areas around the state.