THE AMERICAN WELL OWNER

★ INFORMATION AND ADVICE ABOUT GROUND WATER, WELLS AND WATER SYSTEMS ★

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Ground Water Information, Awareness & Education Since 1986

Understanding Water Test Reports

MESSAGE FROM THE PUBLISHER

This issue of *THE AMERICAN WELL OWNER* includes articles related to water quality. Home owners with lawns and gardens can play an important role in protecting water quality. The National Gardening Association calculates that America's 30+ million acres of tended lawn in yards, golf course and parks receive about $10 billion worth of seed, sod and chemicals each year. Eighty-three percent of all U.S. households, (estimated 91 million households), participate in one or more types of do-it-yourself indoor and outdoor lawn and garden activities. Estimates from NASA's Ames Research Center show that the area of tended lawn in the US is three times more than the largest irrigated crop, which is corn.

Homeowners with wells have a strong vested interest in minimizing the use of lawn and garden chemicals. There is always the risk of some of the chemicals ending up in ground water. There are environmentally friendly options to control pests and promote plant growth that don't need the use of chemicals. All well owners are recommended to spend 10 or 15 minutes on-line using the key words such as "potential hazards of garden chemicals" or "organic lawn care" to find out more about the options. Most Cooperative Extension Offices have information on lawn & garden chemicals that is specific to local climate and soils.

If homeowners do decide to apply chemicals, then applying them in amounts and in the weather conditions detailed in the manufacturer's instructions, not using them close to the well area, proper storage and proper disposal of unused products are all particularly important things to remember in order to minimize risks to ground water.

Andrew Stone

American Ground Water Trust

Understanding your water test report is the first step in understanding the quality of the drinking water you get from your well. Unfortunately, there is no consistent format across the United States for these reports and for the non-chemist the information is frequently difficult to understand. There are some items that are likely to appear on most test results reports.

In many cases, this information is set up in a table format. Listed below are brief explanations:

Analyte or Parameter
- What compound, substance or organism was tested for.

Test Method
- Usually an EPA or State-approved method for the specific analyte identified with an alphanumeric designation (eg. EPA 200.8 for metals)

Result
- The measured value from the test. This is reported as a concentration (weight per unit volume) for many chemicals and metals. Typically, the label for the value is listed as milligrams per liter (mg/L) or micrograms per liter (ug/L). These are also referred to as parts per million (ppm) or parts per billion (ppb), respectively.

Method Detection Limit (MDL)
- This limit is the smallest concentration that the test method can "see" or find in the sample. If the analyte is present at a concentration above the MDL a value will be listed in the Result column. If the analyte is not "seen" it may be noted in the Result column in a number of ways including notations such as BDL (below detection limit), ND (non detect) or with a less than symbol (<) next to the Method Detection Limit value.

Maximum Contaminant Level (MCL)
- The EPA has established maximum contamination levels for a number of compounds

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UNDERSTANDING WATER TEST REPORTS. . . continued from page 1

and metals that will protect human health. Where these exist they should be noted somewhere in the report either by asterisk or in a separate column for each analyte. MCLs are legally enforceable limits for public water supplies and should be used as health benchmarks by private well owners. Secondary MCLs exist for compounds that do not pose health risks and are set up to control the aesthetic quality of the water. The SMCL (secondary MCL) values may or may not be listed in the report, but can be obtained by calling the laboratory that provided the report.

For bacteriological samples the Detection Limit is handled differently than for compounds and metals. There are several test methods for coliform bacteria, the presence of bacteria is the basis for determining whether a water supply is potable and acceptable for drinking. The results are reported in two ways depending on the method. Color indicator methods report as "present or absent." Membrane filtration methods report the number of bacteria in a certain volume of sample water and report as count per 100 milliliters of water (ct/100mL). A result of 1ct/100mL is usually considered acceptable for public water supplies. A "safe" test result may be required by lending institutions or by state regulations at the time of property transactions.

Other information that should appear in the report includes the date and time the water sample was collected and then analyzed by the laboratory. In many cases, the location where the sample was collected and the sampler's name are listed.

Federal and state governments do not inspect or oversee the water quality from private wells. It is the homeowner's responsibility to periodically monitor the drinking water from the well. A basic annual water test should include coliform bacteria and nitrates.

It is unlikely that the laboratory report will tell you what to do if you have a result above the MCL. It is important to find out the reason for the problem before rushing to fix it! Please visit the Trust's website at www.agwt.org for further guidance on water testing and on water treatment/ conditioning options.

Pesticides and Ground Water

You have a well and you want to have a lush lawn and productive garden. Chemicals can be very effective in controlling weeds and pests – but you don't want them in your drinking water. Knowing something about lawn and garden chemicals should be a first step.

Historical Background to Pesticide use:

Even before 500 BC sulphur was used to prevent damage to crops. By the 15th century, arsenic, mercury, and lead were being used to kill pests and in the 17th century, nicotine from tobacco leaves was used to kill insects. In the 19th century, pyrethrum, which came from chrysanthemums, and rotenone from the roots of tropical legumes, were added to the arsenal of weapons to fight or reduce problem insects and weeds. In 1939, Swiss chemist Paul Müller discovered that DDT was an effective insecticide and it became a widely used pesticide. The major developments of chemical agricultural pesticides occurred in the years after World War II. Pesticides originally developed for farmers are now available to homeowners as a way to have lush gardens and green lawns.

The problem – Pesticides and Health

It was the famous book "Silent Spring" by Rachel Carson in 1960 that showed that pesticides have huge environmental costs. Pesticides are poisons and directly or indirectly are likely to create health risk to living creatures. Young or developing creatures are more vulnerable to the effects of pesticides because their brains, immune systems are not fully developed. The effects of many pesticides have not been fully tested, and long-term, cumulative effects are not known.

Pesticide Residuals in the Environment

The United State Geological Survey (USGS) completed a major study of pesticides and herbicides in the waters of the US (Pesticides in the Nation's Streams and Ground Water [Fact Sheet 2006-3028]). The results of the 10 year study document

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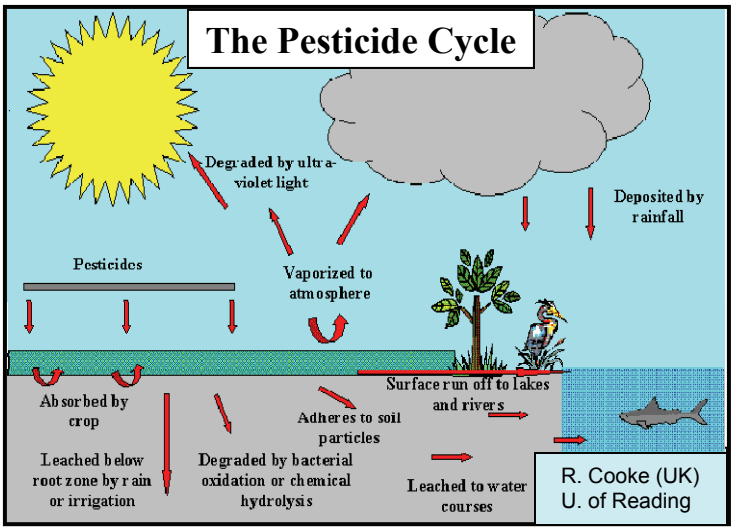
PESTICIDES AND GROUND WATER. . . continued from page 2

seventy-six pesticide products used in agriculture and in urban or suburban areas found in the nation's rivers and lakes.

Ground water samples from a third of the deep wells tapping major aquifers showed at least one pesticide or breakdown product. Fifty percent of shallow ground water wells had pesticide detection. For both the stream and ground water samples, the concentrations were usually below drinking water standards set by the U.S. Environmental Protection Agency (EPA). Ten percent of the stream samples and about one percent of the ground water samples had concentrations of at least one pesticide exceeding its drinking water standard.



Well Owner Responsibilities

Americans use millions of pounds of chemicals each year to control lawn weeds and garden pests. When used responsibly and according to instructions, these chemicals can generally do their job without jeopardizing water quality. However, to protect ground water, "less is better" when using chemical pest-control products. Pesticides do not immediately evaporate or disappear after application. Many products can remain viable (harmful to human and animal health) for a significant period if the product infiltrates into the ground and is not subject directly to sunlight or surface atmospheric conditions. To protect ground water resources and natural habitats home owners should carefully follow product instructions and avoid using these products in places where they may migrate to water resources. Safe storage of chemicals and proper disposal of unused products are important responsibilities.

Consider Alternatives to Garden Chemicals

Lawn pests might be a symptom of a soil nutrient problem with the pests being an indication of lawn stress. Addition of correct amounts of supplemental nitrogen, phosphorus or potassium and/or the selection of a more appropriate mix of grass species may get rid of lawn pests. To prevent recurring pest problems the conditions that attracted the pest have to be changed.

Many insects are beneficial and many chemicals are toxic to non-target populations. While not a "bug," earthworms are very beneficial to lawns and gardens but are very susceptible to pesticides.

Get Advice and Information

There are many web-sites with advice and guidance about lawn & garden best management practices (BMPs) for home owners. County Extension offices are a very good source of advice for homeowners. For information on pesticides in the nation's waters, visit the USGS National Water-Quality Assessment (NAWQA) pesticide study site at: http://ca.water.usgs.gov/pnsp/pubs/circ1291/index.html

HOW MUCH IS A PPM? (PART PER MILLION). . . continued from back page

The emerging concerns involving residual and discarded personal care products and pharmaceuticals that pass through our bodies, are being measured in the environment at parts per trillion (ppt) level concentrations. A ppt is 1 million times smaller than one ppm and one ppt is at the analytical detection limit of most existing laboratory testing methods and instrumentation. [One ppt can be compared to one second every 320 centuries]

All natural waters (springs, wells, rivers, lakes, oceans) contain some dissolved substances. Many typical water constituents (such as calcium, iron, potassium and sodium) present little or no health risks. Water tests for any supply source used for drinking are recommended to check out the water's constituents. The Environmental Protection Agency has developed maximum contaminant levels (MCL) for many substances and the recommended MCLs are given as ppm or ppb and can be found on the internet at: http://www.epa.gov/safewater/contaminants/index.html

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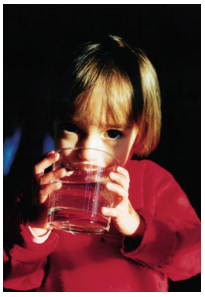
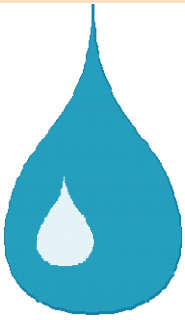


◆ Bulk purchases by health officials, realtors, homeowner's associations, contractors, laboratories, etc. available. Call the Trust office for more information.

TOPICS IN UPCOMING ISSUES
- What is Tannin?
- Radioactivity and Ground Water
- Natural A/C—Geothermal Heat Pumps

How Much Is A PPM? (Part Per Million)



Parts per million is abbreviated as ppm and is often used when describing concentrations of substances in water, air, or soil. It represents the amount of one substance in another substance and in a strict sense should be either a weight-to-weight or a volume-to-volume relationship. In water testing situations where concentrations of constituents are very low an exception is commonly made to equate milligrams per liter (mg/L) of water to parts per million (ppm). Considering ppm and mg/L to be the same is only valid for low concentrations of dissolved substances and where the density of water is assumed to be one (i.e., 1 milligram (weight) = 1 milliliter (volume) of water). The mg/L and ppm comparison should not be made when dissolved concentrations are very high (like seawater).

In any case, a ppm is a very small quantity. What does it mean? How can one ppm be visualized? Here are a few examples that describe a ppm that may resonate more closely with activities and numbers we experience. One ppm is equal to:

- one penny in one million pennies ($10,000 dollars)
- one inch in sixteen miles
- one millimeter-sized sand grains (thickness of a dime), packed in a 4 inch cube.
- one minute in about 23 months (694 days, 10 hours, 40 minutes)
- one second in 11 ½ days
- one 1-milligram drop in 1 kilogram of water (about one quart)
- one teaspoon (5 m/L or 5 cm^3) in 1,320 gallons
- one dry pea in about 6 tons of peas (one pea is about 0.2 ounces)

A part per billion (ppb) is also commonly used to represent water quality data. A ppb is 1,000 times smaller than one ppm. [One ppb can be compared to one second in 32 years!]

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