# How to Interpret a Water Analysis Report

**What is the significance of the parameters listed in the water test report? This article outlines some of the major parameters you may see on the analysis and assists you in understanding the report.**

Whether your water causes illness, stains on plumbing, scaly deposits, or a bad taste, a water analysis (see *Where to Have Your Water Tested* ) identifies the problem and enables you to make knowledgeable decisions about water treatment.

## Features of a Sample Report

Once the lab has completed testing your water, you will receive a report that looks similar to Figure 1. It will contain a list of contaminants tested, the concentrations, and, in some cases, highlight any problem contaminants. An important feature of the report is the units used to measure the contaminant level in your water. Milligrams per liter (mg/l) of water are used for substances like metals and nitrates. A milligram per liter is also equal to one part per million (ppm)—that is one part contaminant to one million parts water. About 0.03 of a teaspoon of sugar dissolved in a bathtub of water is an approximation of one ppm. For extremely toxic substances like pesticides, the units used are even smaller. In these cases, parts per billion (ppb) are used. Another unit found on some test reports is that used to measure radon—picocuries per liter. Some values like pH, hardness, conductance, and turbidity are reported in units specific to the test.

In addition to the test results, a lab may make notes on any contaminants that exceeded the PA DEP drinking water standards. For example, in Figure 1 the lab noted that total coliform bacteria and iron both exceeded the standards.

Retain your copy of the report in a safe place as a record of the quality of your water supply. If polluting activities such as mining occur in your area, you may need a record of past water quality to prove that your supply has been damaged.

*** ANALYTICAL LABORATORY REPORT ***

Client: Client's name — Collected by: KM

Project: Analytical Laboratory Services — Project Number: CL000001

Date Collected: 08/28/90 — Time Collected: 7:35 am

Sample Identification: Kitchen Tap — Lab Number: 01000

| Analysis | Results | Units |
|---|---|---|
| Total Coliform Bacteria | 50 | # /100ml |
| Nitrate-Nitrogen | 4.55 | mg/l |
| pH | 7.50 | units |
| Iron | 0.55 | mg/l |
| Hardness as CaCo3 | 280 | mg/l |
| Sulfate Sulfur | 32.0 | mg/l |
| Chloride | 25.4 | mg/l |
| Specific Conductance | 344 | umhos/cc |

On the basis of the above test result(s), this water sample DOES NOT MEET PaDER drinking water standards

The following notes apply to this sample:

The Total Coliform Bacteria exceeded the max. lev. of 1 colony/100ml.
The Iron level exceeded the limit of 0.3 mg/l.

Submitted by:_____
Laboratory Manager

Figure 1. A sample water analysis report.

# Water test parameters

The following tables provide a general guideline to common water quality parameters that may appear on your water analysis report. The parameters are divided into three categories: health risk parameters, general indicators, and nuisance parameters. These guidelines are by no means exhaustive. However, they will provide you with acceptable limits and some information about symptoms, sources of the problem and effects. To find out more about how to treat the water or eliminate the contaminant at the source, see related publication F 103 How to Interpret a Water Analysis Report. See the end of this publication for information on how to obtain additional publications.

## Health Risk Parameters

The parameters in Table 1 are some commons ones that have known health effects. The table lists acceptable limits, potential health effects, and possible uses and sources of the contaminant.

| Contaminant | Acceptable Limit | Sources/Uses | Potential Health Effects at High Concentrations |
|---|---|---|---|
| * Recommended level in water at which remedial action should be taken. No mandatory standards have been set. | | | |
| Atrazine | 3ppb or.003 ppm | used as a herbicide; surface or ground water contamination from agricultural runoff or leaching | heart and liver damage |
| Benzene | 5 ppb or.005 ppm | gasoline additive; usually from accidental oil spills, industrial uses, or landfills | blood disorders like aplasticaremia; immune system depression; acute exposure affects central nervous system causing dizziness, headaches; long term exposure increases cancer risks |
| Leat at tap | 0.01 mg/l | used in batteries; lead gasolines and pipe solder; may be leached from brass faucets, lead caulking, lead pipes, and lead soldered joints | nervous disorders and mental impairment, especially in fetuses and infants; kidney damage; blood disorders and hypertension; low birth weights |
| Nitrates ($NO_3$) | 10mg/l (nitrate-N) 45 mg/l (nitrate) | soil by-product of agricultural fertilization; human and animal waste leaching to groundwater | methemoglobinemaia (blue baby disease) in infants (birth to 6 months); low health threat to children and adults |
| Total Coliform | <1 coliform/100 ml | possible bacterial or viral contamination from human sewage or animal manure | diarrheal diseases, constant high level exposure can lead to cholera and hepatitis |
| Radon | 300 pCi/l* | naturally occurring gas formed from uranium decay; can seep into well water from surrounding rocks and be released in the air as it leaves the faucet | breathing gas increases chances of lung cancer; may increase risk of stomach, colon and bladder cancers |

Table 1: Standards, symptoms, and potential health effects of regulated contaminants.

## General Water Quality Indicators

General Water Quality Indicators are parameters used to indicate the presence of harmful contaminants. Testing for indicators can eliminate costly tests for specific contaminants. Generally, if the indicator is present, the supply may contain the contaminant as well. For example, turbidity or the lack of clarity in a water sample usually indicates that bacteria may be present. The pH value is also considered a general water quality indicator. High or low pHs can indicate how corrosive water is. Corrosive water may further indicate that metals like lead or copper are being dissolved in the water as it passes through distribution pipes. Table 2 shows some of the common general indicators.

| Indicator | Acceptable Limit | Indication |
|---|---|---|
| pH value | 6.5 to 8.5 | An important overall measure of water quality, pH can alter corrosivity and solubility of contaminants. Low pH will cause pitting of pipes and fixtures or a metallic taste. This may indicate that metals are being dissolved. At high pH, the water will have a slippery feel or a soda taste. |
| Turbidity | <5 TU | Clarity of sample can indicate contamination. |
| Total Dissolved Solids (TDS) | 500 mg/l | Dissolved minerals like iron or manganese. High TDS also can indicate hardness (scaly deposits) or cause staining, or a salty, bitter taste. |

Table 2. General water quality indicators.

*Nuisance contaminants* are a third category of contaminants. While these have no adverse health effects, they may make water unpallatable or reduce the effectiveness of soaps and detergents. Some nuisance contaminants also cause staining. Nuisance contaminants may include **iron bacteria, hydrogen sulfide, and hardness**. Table 3 shows some typical nuisance contaminants you may see on your water analysis report.

| Contaminant | Acceptable Limit | Effects |
|---|---|---|
| Chlorides | 250 mg/l | salty or brackish taste; corrosive; blackens and pits stainless steel |
| Copper (Cu) | 1.3 mg/l | blue-green stains on plumbing fixtures; bitter metallic taste |
| Iron (Fe) | 0.3 mg/l | metallic taste; discolored beverages; yellowish stains, stains laundry |
| Manganese (Mn) | 0.05 mg/l or 5ppb | black stains on fixtures and laundry; bitter taste |
| Sulfates ($SO_4$) | 250 mg/l | greasy feel, laxative effect |
| Iron Bacteria | present | orangeish to brownish slime in water |

Table 3. Common nuisance contaminants and their effects.

Hardness is one contaminant you will also commonly see on the report. Hard water is a purely aesthetic problem that causes soap and scaly deposits in plumbing and decreased cleaning action of soaps and detergents. Hard water can also cause scale buildup in hot water heaters and reduce their effective lifetime. Table 4 will help you interpret the hardness parameters cited on your analysis. Note that the units used in this table differ from those indicated in Figure 1. Hardness can be expressed by either mg/l or a grains per gallon (gpg). A gpg is used exclusively as a hardness unit and equals approximately 17 mg/l or ppm. Most people object to water falling in the "hard" or "very hard" categories in Table 4. However, as with all water treatment, you should carefully consider the advantages and disadvantages to softening before making a purchasing a water softener.

| Concentration of hardness minerals in grains per gallon (GPG) | Hardness Level |
|---|---|
| * level at which most people find hardness objectionable | |
| below 1.0 | soft |
| 1.0 to 3.5 | slightly hard |
| 3.5 to 7.5 | moderately hard |
| 7.5 ti 10.5* | hard |
| 10.5 and above | very hard |

Table 4. Hardness classifications.

## Additional Resources

For more detailed information about water testing ask for publication *Water Tests: What Do the Numbers Mean?* at your local extension office or from this website.

Prepared by Paul D. Robillard, Assistant Professor of Agricultural Engineering, William E. Sharpe, Professor of Forest Hydrology and Bryan R. Swistock, Extension Associate

## Contact Information

**Bryan Swistock**
Senior Extension Associate; Water Resources Coordinator
brs@psu.edu
814-863-0194

### extension.psu.edu

**Penn State College of Agricultural Sciences research and extension programs are funded in part by Pennsylvania counties, the Commonwealth of Pennsylvania, and the U.S. Department of Agriculture.**



Code: F103