How to Interpret a Water Analysis Report

This article outlines some of the major parameters you may see on the analysis and assists you in understanding the numbers on a water test report.

Whether your water causes illness, stains on plumbing, scaly deposits, or a bad taste, a water analysis 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.

---

**Table 1: Health Risk Parameters**

<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Result</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Coliform Bacteria</td>
<td>58</td>
<td># /100ml</td>
</tr>
<tr>
<td>Nitrate-Nitrogen</td>
<td>4.55</td>
<td>mg/l</td>
</tr>
<tr>
<td>pH</td>
<td>7.50</td>
<td>units</td>
</tr>
<tr>
<td>Iron</td>
<td>0.55</td>
<td>mg/l</td>
</tr>
<tr>
<td>Hardness as CaCO3</td>
<td>280</td>
<td>mg/l</td>
</tr>
<tr>
<td>Sulfate Sulfur</td>
<td>30.0</td>
<td>mg/l</td>
</tr>
<tr>
<td>Chloride</td>
<td>25.4</td>
<td>mg/l</td>
</tr>
<tr>
<td>Specific Conductance</td>
<td>344</td>
<td>umhos/cm</td>
</tr>
</tbody>
</table>

On the basis of the above test result(s), this water sample DOES NOT MEET PADEP 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.

---

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.

Health Risk Parameters

The parameters in Table 1 are some commonly known health effects. The table lists acceptable limits, potential health effects, and possible uses and sources of the contaminant.
<table>
<thead>
<tr>
<th>Contaminant</th>
<th>Acceptable Limit</th>
<th>Sources/Uses</th>
<th>Potential Health Effects at High Concentrations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atrazine</td>
<td>3 ppb or. 003 ppm</td>
<td>used as a herbicide; surface or ground water contamination from agricultural runoff or leaching</td>
<td>heart and liver damage</td>
</tr>
<tr>
<td>Benzene</td>
<td>5 ppb or. 005 ppm</td>
<td>gasoline additive; usually from accidental oil spills, industrial uses, or landfills</td>
<td>blood disorders like aplasticaroma; immune system depression; acute exposure affects central nervous system causing dizziness, headaches; long term exposure increases cancer risks</td>
</tr>
<tr>
<td>Lead at tap</td>
<td>0.015 ppm or 15 ppb</td>
<td>used in batteries; lead gasolines and pipe solder; may be leached from brass faucets, lead caulking, lead pipes, and lead soldered joints</td>
<td>nervous disorders and mental impairment, especially in fetuses and infants; kidney damage; blood disorders and hypertension; low birth weights</td>
</tr>
<tr>
<td>Nitrates (NO&lt;sub&gt;3&lt;/sub&gt;)</td>
<td>10 mg/l (nitrate-N) 45 mg/l (nitrate)</td>
<td>soil by-product of agricultural fertilization; human and animal waste leaching to groundwater</td>
<td>methemoglobinemaia (blue baby disease) in infants (birth to 6 months); low health threat to children and adults</td>
</tr>
<tr>
<td>Total Coliform</td>
<td>&lt;1 coliform/100 ml</td>
<td>possible bacterial or viral contamination from human sewage or animal manure</td>
<td>diarrheal diseases, constant high level exposure can lead to cholera and hepatitis</td>
</tr>
</tbody>
</table>
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 NTU 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.

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 5 ppb black stains on fixtures and laundry; bitter taste
Sulfates (SO₄) 250 mg/l greasy feel, laxative effect
Iron Bacteria present orangish to brownish slime in water

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.

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.

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, Senior Extension Associate, Department of Ecosystem Science and Management

Authors

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.

Where trade names appear, no discrimination is intended, and no endorsement by Penn State Extension is implied.

This publication is available in alternative media on request.

Penn State is an equal opportunity, affirmative action employer, and is committed to providing employment opportunities to all qualified applicants without regard to race, color, religion, age, sex, sexual orientation, gender identity, national origin, disability, or protected veteran status.

© The Pennsylvania State University 2020

Code: ART-2161