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# Bottled Water Testing

What lab results mean and how to explain them to customers

Consumers want to know if the bottled water they buy is safe. How and why bottled water is regulated is not common knowledge and can be confusing to customers. Bottlers who understand and can explain aspects of water quality, regulations and test results to their customers have a useful sales tool to promote their product.

The true definition of water is represented by the simple formula H<sub>2</sub>O. A molecule formed by one oxygen ion and two hydrogen ions double-bonded together to create an odorless, colorless and tasteless liquid. Water in its purest form of exclusively H<sub>2</sub>O virtually is nonexistent due to its instability. Water

is known as the universal solvent because of its ability to dissolve at least a portion of whatever it touches including rocks, gases, dust and other particles. It is this solvent action that drives drinking water quality concerns. When assessing water quality, three basic questions must be answered.

- What is in the water?
- What levels of contaminants are present in the water?
- Is the water safe to drink?

**What is in the Water?**

For drinking water, a contaminant can be defined as any substance or matter other than pure H<sub>2</sub>O. Some

contaminants may be undesirable as they may pose a health risk or impart an undesirable taste, odor or color. Other contaminants are highly desirable and may be added to water for a unique taste, texture and body. Regardless of being desirable or

undesirable, water contaminants can be broken down into the following classifications: microbiological, inorganic, organic and radiological.

- **Microbiological.** This includes microscopic living organisms such as bacteria, yeast, viruses, molds, cysts, algae, etc.
- **Inorganic.** Elemental metals and chemical substances that do not contain hydrocarbons (ex: calcium, iron, nitrates, bromate, etc.)
- **Organic.** Compounds with a carbon-hydrogen structure. These can be further broken down into volatile organic chemicals (cleaning solvents, petroleum by-products) and semi-volatile organic chemicals (pesticides, herbicides, base/neutral acid extractable compounds).
- **Radiological.** Elements that emit atomic energy which is generally in the form of alpha and beta particles of gamma rays (uranium, radon, radium, etc.).

**At What Level is a Contaminant Present, and Is It Safe to Drink?**

To answer these questions it is important to understand how contaminants are regulated and the process by which limits are developed.



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Unfortunately, testing for everything in water is not possible as analytical methods have not been developed for every conceivable chemical combination. Even if there were methods, the testing would be extremely cost prohibitive. For this reason, bottled water is required to test for the presence of a list of undesirable contaminants that have been identified as potentially present in bottled water. Since bottled water is regulated as a food product, the FDA establishes the contaminants for which it must be tested as well as which levels are considered safe. These guidelines, which bottled water must meet, are the Standards of Quality (SOQ's).

In general, "drinking water" is regulated by the U.S. Environmental Protection Agency (EPA). The Safe Drinking Water Act (SDWA) enables the EPA to establish the contaminants and maximum contaminant levels (MCLs) that public water supplies must meet.

The contaminants regulated by the FDA and the SOQs for those contaminants, are almost identical to the EPA SDWA National Drinking Water Contaminants and corresponding MCLs. The FDA is required by a congressional hammer clause in the SDWA to consider each contaminant the EPA adds to determine the applicability to bottled water. In almost every instance, the FDA has determined the parameter is a potential contaminant for bottled water and established an SOQ equivalent to that of the EPA's MCL. Therefore, understanding the process by which MCLs are established by the EPA can help clarify the impact of contaminant detection in bottled water.

First, the EPA SDWA Drinking Water Standards divides contaminants into two categories.

- **Primary contaminants** pose a potential health risk.
- **Secondary contaminants** have shown no potential health impact and are regulated purely for aesthetic reasons such as taste, color, odor or potential plumbing nuisances for public water systems.

When the EPA regulates a primary (health-based) contaminant they also establish an MCL. An MCL is the practical and legally enforceable standard that a PWS must meet. Generally, MCLs are established at a level resulting in a less than 1 in 100,000 to 1 in 1 million chance of contributing to a health effect if an individual consumes eight 8-oz. glasses of water containing the contaminant at that level each day over the course of a lifetime.

#### Interpreting an Analytical Report

While report formats differ slightly from one laboratory to the next, results

generally are presented in a tabular format and include the following information.

**Analysis Performed.** The items or parameters for which the laboratory tested.

**Method.** References the analytical method the laboratory used to perform the test.

**Lower Reporting Level (LRL).** The smallest quantity of a contaminant

that the instruments can detect with accuracy. This also can be referenced as the detection limit or minimum detection level (MDL) by some laboratories.

**Results.** The actual level found in the sample. An "ND" means the parameter was not detected at a level above the LRL. Some laboratories omit an LRL column and report a less than result (for example, <0.001) if the parameter is not detected above their LRL.

#### Units of Measure.

- **Milligrams per liter (mg/L).** Unit of measurement often used for reporting. For example, 1 mg/L of iron can be thought of as for every million grams of water, there is one gram of iron.
- **Micrograms per liter (ug/L).** Unit of measurement often used for reporting. For instance, 1 ug/L of iron can be thought of as for every billion grams of water there is one gram of iron. (1,000 ug/L is equal to 1 mg/L)



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- **Pico curries per liter (pCi/L).** Unit of measurement used for radiological contaminants.

### Customer Communication

It often is helpful to inform customers that, by law, all bottled water in the United States must be in compliance with the FDA SOQs, ensuring that it is safe to drink. Understanding and being able to explain to consumers on what the MCLs and SOQs for bottled water are based can offer reassurance as to

the safety of your product. If there is a detection of a parameter considered undesirable but not above the established limit, providing a clear, concise explanation can help allay the customer's concerns. MCLs essentially represent a very long-term exposure risk; therefore, a detection of a primary contaminant does not typically represent an immediate health risk.

Bottled water companies should establish a policy for addressing customer complaints or inquiries. Every employee who may come in contact with customers in person or over the telephone should be informed about the company's customer communication policies, procedures and materials. Miscommunication or conflicting information can cause confusion and undermine consumer confidence in the product. Industry associations such as the International Bottled Water Association as well as certain state or local government agencies require bottlers to have information about water quality readily available to customers.

There are several useful tools for customer communication such as a telephone number on the bottle label, copies of current test results and bottled water quality reports. A telephone number printed on the label can go directly to the plant so employees can handle the calls or the calls can be routed to a call center where information about the bottling company and the water quality can be discussed and/or mailed to customers upon request. Bottlers can send out a sample copy of their latest laboratory report or they may choose to have a high quality brochure produced to convey test results along with treatment process and quality control information. This can be an effective tool for communicating a consistent message in a professional manner that readily is available upon request or as a routine mailer. No matter which form of communication a bottler chooses, today's highly competitive marketplace makes it critical to project a professional image to current or potential customers. **WQP**

### About the Authors

Barbara L. Marteney and Kristin M. Safran of National Testing Laboratories, Ltd. (NTL), specialize in consulting with bottled water companies regarding testing requirements and bottled water quality. They maintain contacts with bottled water regulators, industry associations and the FDA regarding regulatory changes and other issues that impact bottlers. They have authored numerous articles and given various presentations on these topics. Marteney and Safran can be reached at 800-458-3330 or 440-449-2525, Marteney at extension 217 and Safran at extension 215; [food-bev@ntllabs.com](mailto:food-bev@ntllabs.com).

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