TECHNOLOGY UPDATE

By Troy Ethan, Spectrum Laboratories

Shifts in Analytical Requir

In-field testing and analysis become responsibility

Chemical analyses have been an integral part of the water treatment industry since its inception. However, as technology and consumer awareness have changed, so to have the analytical requirements of the industry. To remain successful, the water treatment professional should take advantage of advances in in-field testing as well as advances in laboratory analyses. This article describes the shifts in analytical requirements recommended to satisfy consumer desires and promote expansion of the POU/POE water treatment industry.

Traditional Analyses

Chemical analyses for the water treatment industry traditionally have been for chemicals that affect the application of POE treatment equipment. The tests originally were performed by a laboratory and typically included information for "sizing" a residential softener. Often, some measure of corrosivity was considered and, in some cases, common drinking water contaminants (lead, nitrate/nitrite) were included.

In addition to sizing the equipment, traditional analysis was used to demonstrate the need or benefit of a water conditioner. The problem was that turn-around times were much too long for the interest level of the consumer and, as a result, laboratory analyses were ineffective in conveying the benefits of softened water to the homeowner.

An analysis of hardness and iron levels is adequate to effectively size and program POE softening equipment. In-field testing has displaced laboratory analyses, and the POE industry has grown significantly as a result. In-field analysis provides immediate results, which is very important for a consumer considering the economic benefits of the product. The only time laboratory analyses are required today for the "traditional" parameters is in the case of "problem water" or a skeptical consumer.

Advances in colorimetric titration and test strips have allowed the need for residential water softeners to be effectively demonstrated in the home. Given these advances of in-field analysis and the diminishing "myth" that soft water causes corrosion, laboratory testing essentially has been eliminated as a POE requirement.

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The negative aspects of the shift to in-field testing are that "problem water" is not addressed as well as it used to be and drinking water barely is addressed at all. As sales of POE equipment by water treatment professionals begins to level off, the industry must shift its focus to address the areas of high consumer awareness.

Problem Water Analyses

"Problem water" is any instance where the consumer has an aesthetic complaint about his water. He knows he has a problem, but he does not know what is causing it.

Problem water usually falls under the classification of corrosion, taste/odor or staining (color). In the case of

Table 1. What to Look for in Problem Water

Color/Staining
- Copper
- Iron
- Manganese
- Tannin

Scale
- Aluminum
- Copper
- Magnesium
- Iron
- Calcium
- Silica
- Manganese

Corrosion
- Alkalinity (Total)
- Calcium
- pH
- TDS
- Copper
- Sodium

Odor
- Algae
- Iron Bacteria
- Hydrogen Sulfide
- Total Organic Carbon (TOC)
- pH
- Heterotrophic Plate Count (HPC)
- Mold & Fungi
- Total Coliform

ements

of dealers.

problem water, it is in the dealer's best interest to have a laboratory analysis performed rather than guess at the cause. It is not worth the risk of installing equipment only to find that the equipment does not address all contaminants that are leading to the problem or that the equipment is undersized for the level of contaminant that exists. Problem water varies from site to site. It is not safe to assume that the level of contaminants in one well is the same as the neighbor down the road.

Table 1 lists the contaminants that are most often responsible for the homeowner's problem water concerns. Once the level of contaminants causing the problem is adequately identified, a lasting solution can be proposed. The water treatment dealer should be able to consult with his equipment manufacturer for proper treatment recommendations.

Drinking Water

Addressing problem water issues always has been part of the water treatment industry. In the case of problem water, unlike hard water, the consumer is very aware of the problem. Therefore, there is no rush to get the equipment installed, because there is no concern of waning consumer interest. In most cases, he will be willing to wait for analyses to be performed and will appreciate the professionalism used to solve his problem.

The same can be said about consumer concerns for the safety of their drinking water.

Consumer awareness of drinking water contaminants is at an all-time high. Although many customers are aware of the potential for contamination of their drinking water, they are not aware of how to determine if they have contaminated water or how to treat for the specific contaminant. In many cases, the consumer is interested in having his water analyzed and will appreciate the professionalism used to assess his drinking water requirements.

Drinking Water Contaminant Levels

The EPA has established primary and secondary drinking water standards to address health (primary) and aesthetic (secondary) effects in municipal water supplies. More often than not, this testing is not being performed in the home because when performed in the home, the testing is not adequate for the consumers concern.

Every contaminant with a primary standard has a maximum contaminant

Table 2. Establishing Standards

- **Per Safe Drinking Water Act**—"The Administrator ... shall recommend maximum contaminant levels for each contaminant, which ... may have any adverse effect on the health of persons."
- **Definition of Maximum Contaminant Level (MCL)**—MCLs are established to protect health to the extent feasible, using technology, treatment techniques and other means ... (taking costs into consideration). -per EPA
- **Definition of Maximum Contaminant Level Goal (MCLG)**—MCLGs are established at the level at which no known or anticipated adverse effects on the health of persons occur and which allows an adequate margins of safety. -per EPA

Table 3. Average Treated Water Usage per Person per Day

Type of Water	Gallons Per Day
Municipal Water Treated	180
Treated Water Used for Municipal, Industrial and Government	100
Treated Water for Residential	80
Treated Water Used for Drinking	0.5 per person (0.27 percent of all water treated)

Actual data for Minneapolis as compiled by Dr. D.D. Nowlin from treatment and population records.

level (MCL). Municipalities are required to provide drinking water with concentrations below the MCL. The EPA also has established maximum contaminant goals (MCLG) for many of these chemicals. The primary difference between the MCL and the MCLG is the economic consideration given for removal of the contaminant (see Table 2). When you consider that less than 0.3 percent of water treated is used as drinking water in the home (see Table 3), it only makes sense that the government does not go through great tax payer expense to attain an absolute measure of safety.

The water treatment professional can test for a limited number of these drinking water contaminants in the field, but in most cases, the results will barely meet the MCL, much less the MCLG. In-field tests for drinking water contaminants do not exist for many contaminants, and those that do exist simply do not have low enough detection limits to determine if there is an undesirable presence.

With the exception of fluoride, any level of contamination of a chemical with adverse health effects is bad. Not that a person necessarily will die if his drinking water has trace levels of a chemical for which a primary drinking standard has been set. But if given the choice, most (if not all) consumers would rather have drinking water with zero contaminants that may affect their health. If we can agree that this is true, it stands to reason that the consumer would want detection limits for those contaminants to be as low as possible. Advances in laboratory technology allow detection of the contaminants to extremely low levels, and the POU/POE water treatment industry has products to essentially eliminate drinking water contaminants with health effects.

Low detection limits are the reason why the water treatment professional should use laboratory analyses to address consumer concerns for drinking water contaminants. More importantly, the water treatment professional can offer cost-effective POU options to address the drinking water concerns that are not completely addressed by municipalities and often are not checked on private wells.

Addressing Consumer Concerns

In order to meet the changing demands of consumers, water treatment dealers need to shift their analytical requirements to drinking water contaminants. Consumer awareness already exists; they see the problem in the news and in movies, and concerned consumers want an assessment of which contaminants exist in their water supply.

The consumers' concerns for drinking water contaminants can best be addressed by discussing the primary drinking water standards developed by the EPA. Table 4 lists the MCL and MCLG of some drinking water contaminants that have received industry and media attention in recent years. If an analyses shows that a contaminant exists above the MCL, the choice is obvious: The consumer

Water analysis will be a primary consideration in the expanded role of a dealer.

needs drinking water treatment. In many cases, however, an analysis will show that contaminants exist below the MCL but above the MCLG. The choice is not as obvious, but a call to action is clear. Given the choice, most consumers would rather eliminate all contaminants with potential health effects from their drinking water.

Simply stated, in order to get detection limits that meet the level of consumer concern, a laboratory analysis is required. If low levels of contaminants are detected, the consumer now can make an informed choice. Ideally, the water treatment professional will provide an unbiased analysis and recommend products certified to remove contaminants detected. If nothing is detected, the consumer may decide that his tap water is fine, or he may decide to get a POU/POE technology as an insurance policy. Regardless, he can make his decision with peace of mind.

The water treatment professional always has been called upon to address problem water. Over time, the role of the water treatment professional shifted from problem solver to include education on the benefits of conditioned water. Water analysis was a main part of that expanded role, and today, most of the analysis required for such demonstration can be performed in the home.

As consumer concerns for drinking water safety increase, the role of the water treatment professional is shifting once again. Consumers are calling on the water treatment professional to assess the safety of their drinking water and recommend treatment solutions. Once again, water analyses will be a primary consideration in that expanded role.

By addressing the primary concern of the consumer (safe drinking water), the water treatment professional also can open dialogue on the benefits of conditioned water. In the end, the consumer can make an informed choice on water treatment products that provide health and economic benefits for his family. WQP

About the Author
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For more information on this subject, write in 1015 on the reader service card.

Table 4. Contaminant MCL vs. MCLG

Contaminant	MCL	MCLG
Arsenic	0.01	0
Lead	0.015	0
Alachlor	0.002	0
Benzene	0.005	0
Chloradane	0.002	0
Methyl Chloride	0.005	0
Haloacetic Acid	0.060	0
MTBE	—	—
PCBs	0.0005	0
TCE	0.005	0
THMs	0.005	0