

Opinions and Comments

The Age of Trace Contaminants

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In the December issue an edited version of this article was published as Part I. Due to space limitations in that issue, editorial changes made in the original manuscript inadvertently changed the author's concepts. For this reason, Parts I and II are published here in their entirety.



The 1980s will probably be remembered by the water utility industry as the true beginning of the "Age of Trace Contaminants." During the latter half of the 1970s, the scientific commu-

nity began serious investigations into the potential health effects of trace amounts of various contaminants in water supplies. It was not until the promulgation of the trihalomethane regulation on Nov. 29, 1979, that the full impact of trace contaminant concerns hit the water utility industry. Trace organics are currently causing debate and consternation among utility, public interest and government representatives. However, asbestos, low-level radiation and viruses are potential health issues that lie just over the horizon. Those utility managers that have active consumer interest groups in their areas have undoubtedly already felt the heat from these emerging issues.

My personal philosophy during the past 11 years in the water utility field has been to "safeguard the public health at a reasonable cost to the consumers." The issues that are now arising as a result of trace contaminants in drinking water seem to put the two goals of that philosophy at odds with one another.

There are three major issues facing utility managers: (1) health concerns with the presence of trace organics, particularly trihalomethanes, in drinking water; (2) a mood among the tax paying public to cut government spending (Proposition 13 and related initiatives); and (3) consumers that are becoming more aware of their drinking water quality and are demanding answers to complex tech-

nical problems.

The crux of the entire issue of trace organics in drinking water is the quality of the health effects data and how it is interpreted. The concept of risk assessment is quite new and confusing to most engineers and scientists as well as the public. If the news media in any way reflects the type of information the general public is demanding, it is clear that people want to know, "Is the water safe to drink?" The difficulty is that toxicologists and epidemiologists do not speak in absolute terms. There is no safe or unsafe level when dealing with carcinogens, only levels of risk. We might restate the question as "Do the levels of trace organics that the public are exposed to constitute an acceptable risk?"

The problem in answering this question is that little is actually known about the types of organics in drinking water. Few people realize that the concerns being expressed today are based on our knowledge of 10 to 20 percent of the organic content in drinking water. Existing analytical technology can make only vague efforts at characterizing the other 80 to 90 percent of organic matter in water. The overwhelming majority of organics are of the so-called natural organic background. The alchemist's dream of developing the universal solvent was always before his eyes and on his lips. Water truly is the universal solvent in that it will dissolve almost anything to some extent. When water comes in contact with soils or vegetation it will pick up natural organic compounds.

The sources of the 10 to 20 percent of the total organics we know about are fairly well understood. Industrial contamination and agricultural runoff are highly suspect. The largest blow to water utility engineers was the discovery that chlorine, which is added to protect the public from infectious diseases, produces products in its reaction with natural organics that are called trihalomethanes or THMs. One of the THMs, chloroform, has been shown to produce specific cancers in laboratory animals at high dosages. EPA recognized that not using

chlorine to disinfect water supplies also carried an inherent risk and the final maximum contaminant level (MCL) was established at 0.10 mg/L on the basis of feasibility and risk assessment.

The assignment of MCLs for organic chemicals in water causes great confusion and controversy. The use of animal feeding experiments, mutagenic screening tests and epidemiological surveys to develop MCLs are currently under attack because of the inherently imprecise nature of these tools. Unfortunately, they are the best tools we have. EPA decision makers are unwilling to accept the risk that the evidence produced by these tools is too imprecise to be used. In fact, they are obligated under the Safe Drinking Water Act (PL93-523) to regulate these substances that may cause adverse health effects. There is a fear that another 10 to 20 years of population exposure might result in a real increase in cancer incidence not now measurable.

There are practical concerns of imprecise and expensive analytical techniques, decisions based on grab samples rather than representative or composite sampling schemes and a true shortage of trained personnel to perform and interpret the results. Even though not universally understood there are treatment techniques that will remove all contaminating substances from water and leave two parts hydrogen and one part oxygen. Granular activated carbon, reverse osmosis, air stripping and even more exotic technologies are available in the engineer's bag of tricks albeit at a hefty price. Furthermore, there are nontreatment options available to solve trace organics problems such as effluent source control and changing the source of supply. This brings us to the second part of the philosophy which requires us to do all of this at "a reasonable cost to the consumers."

With cost now in the equation and scientific judgments that are less than absolute, decisions regarding trace organics are fair game in the

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political arena. Because the public must ultimately either pay for additional treatment costs or suffer the potential consequences, they should be made part of the decision process. The days of engineers making public health decisions in a vacuum are gone forever. In my view there is a segment of the population that can deal with the complex issues of risk assessment and aid the political process.

The question of funding mechanisms to assist water utilities to meet the Safe Drinking Water Act requirements is now being addressed by utility and regulatory personnel. It is widely agreed that "governmental grants to aid water utilities in the construction of necessary facilities are undesirable in that they destroy the financial and managerial independence necessary to self-sustained businesslike operations." (AWWA policy statement adopted May 8, 1977). There are, however, many utilities faced with severe financing problems that require some assistance. The concept of government loans or guarantees instead of grants has been suggested as a possible remedy. This approach may provide a workable solution only if the strings attached to the loans are reasonable and minimal. Enough people have had unfortunate experiences with the Clean Water Grants Program (PL92-500) to be wary of "gifts" from Washington, D.C.

Uncertainty is the byword of many water utility operations given the problems raised by the trace contaminant issues. The future holds more of the same for water utility managers. There are bright spots ahead including the challenge to deal with complex issues and to resolve new public health issues. I feel certain that the water utility industry will rise to these challenges. ■