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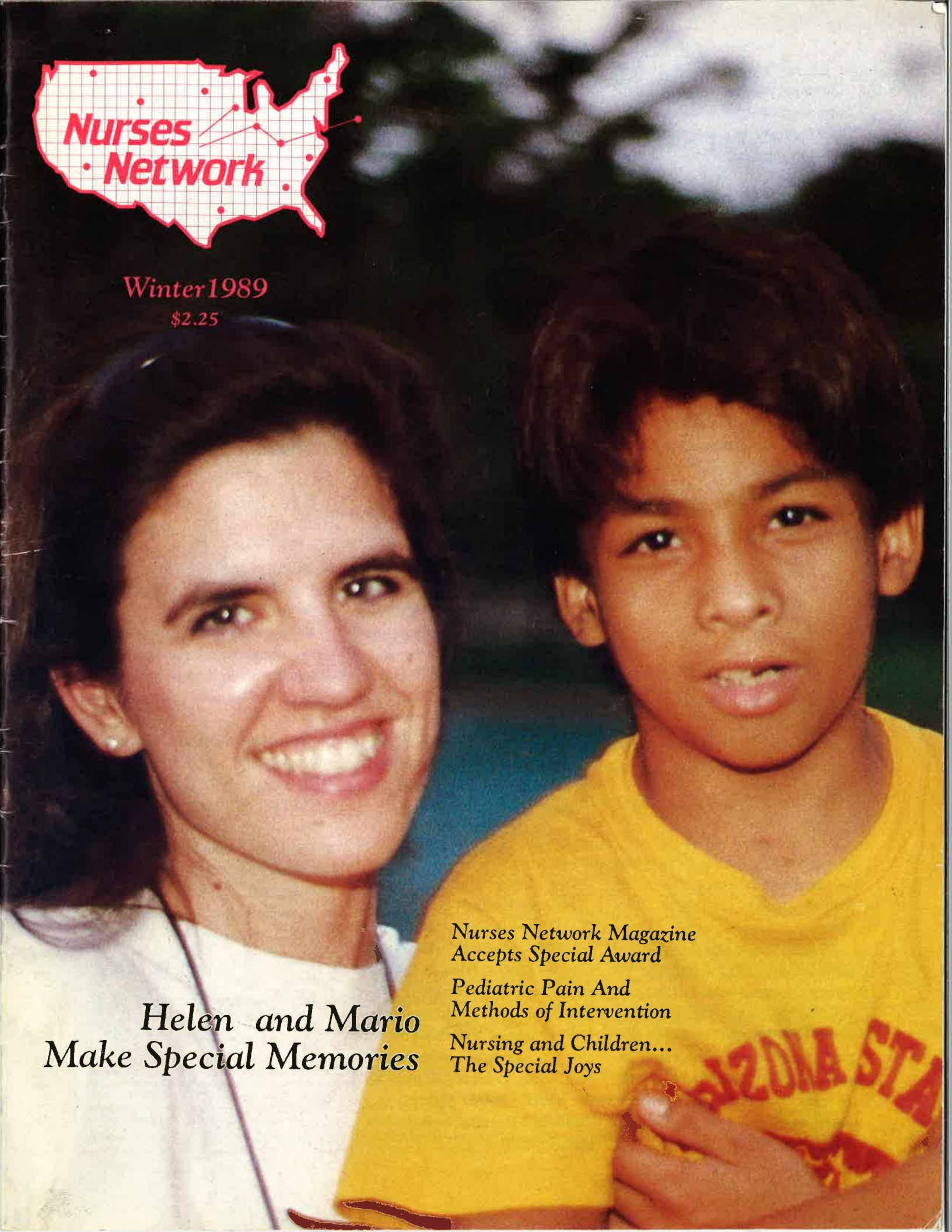

Helen and Mario Make Special Memories

Nurses Network Magazine Accepts Special Award

Pediatric Pain And Methods of Intervention

Nursing and Children... The Special Joys

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Drinking Water and Public Health

By Richard C. Stump, Laboratory Director, Suburban Water Testing Laboratories, Inc.

In the beginning God created the heavens and the earth, and God proceeded to search for a substance that would be salty in the oceans yet fresh on the land, exist in the sky as well as on and under the ground, cleanse the air and purify itself, cool parched ground yet warm frozen lakes, create mountains and carve valleys, dissolve anything even solid rock while at the same time would combine with soil and air to support life, trees, plants, even man, and there came to be water. And God looked at the water and said it was good, and it continued to be so until man dumped garbage into the ocean, turned the rain to acid, dumped toxic waste into the rivers, and buried those things he did not wish to look at near the water under the earth. So the account might read if the book of Genesis were written today.

The past 20 years has seen an escalation in the public's awareness of pollution. A continual flow of articles dealing with all kinds of pollution stream from nearly every form of news media. There has been so much in the news about water pollution that some have said they are tired of reading about it. The real question is, how is water pollution affecting the health of the population? The simple answer is for the most part no one really knows. The instances where people have been exposed to large doses of contaminants are well documented and the effects are readily apparent. For instance, consider Trichloroethylene (TCE). Acute exposure depresses the central nervous system and shows symptoms such as headache, dizziness, vertigo, tremors, nausea and vomiting, irregular heartbeat, sleepinesss, fatigue, blurred vision, intoxicating unconsciousness and death. Arriving at those conclusions was relatively simple since all one had to do was record the effects of accidental over exposure to TCE. On the other hand, determining what adverse effects will occur in a given population that has a few parts per billion (ppb) of TCE in its drinking water is quite another matter. The Environmental Protection Agency (EPA) on July 8, 1987 in the Federal Register set a maximum contaminant level (MCL) for TCE at 5 ppb.

It took at least seven years of consideration and public comment to set an MCL for TCE an seven other related chemicals. The question that had to be considered were at times very difficult. What is a safe level of a cancer causing compound, how much money should be spent to save one human life, to name just two of them. One of the difficulties with studying health effects is that there are very few opportunities to study humans. Therefore, most of the data must be based on animal studies. Since animal studies must be done on a accelerated basis using high dosages of the chemical used over a relatively short period of time, it is very difficult to translate the information into lifetime effects on humans. However, there have been and no doubt are large sections of people using water that contains TCE and other chemicals. Therefore, it is possible to study those sections of people and compare similar population groups elsewhere to determine if the water has caused any ill effects. One such study was conducted in Woburn, Massachusetts by the Harvard School of Public Health in Boston, Massachusetts. Portions of the town received water containing, among other things, 267 ppb of

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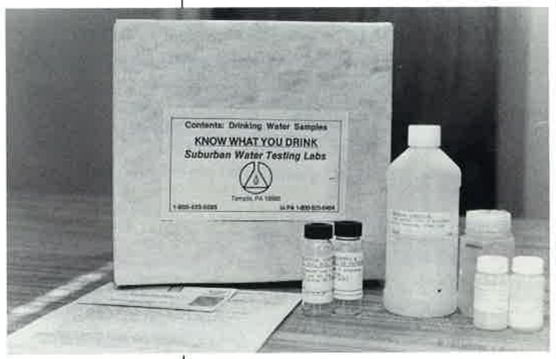

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TCE. The study showed a statistically significant positive association between access to the water and the incidence rate of childhood leukemia, lung and kidney disorders, and other disorders. Naturally, since such studies deal with damages to people, they are inclined to provoke lawsuits which, unfortunately, can discourage similar studies.

One of the distressing things about chemical contamination is the fantastically small quantities that we are concerned with. The EPA'S MCL of 5 ppb equates to 1 gallon of TCE in nearly 300,000,000 gallons of water. If that's hard to imagine, picture a white string running from Pennsylvania across land and sea to Australia then running from Australia across land and sea up into China. Now imagine that somewhere along the way is 5 inches of red string - that is 5 ppb of red string. Or in the case of Woburn, Massachusetts, there would be 22' 3" of red string. Some scoff at even being concerned with such minuscule quantities, yet the evidence indicates the concern is not without good reason.

The EPA in 1982 conducted a random survey of water supplies that use ground water (well water as opposed to lakes and streams) as their source. They found that 21 percent of the systems contained TCE or other volatile organic chemicals. With over one system in five showing traces of man made chemicals it becomes apparent that no area is immune to this type of contamination. In view of the extremely small amounts that are considered harmful, it also becomes apparent that special equipment is required to analyze for these chemicals and others.

Larger municipal water systems maintain laboratories with specially trained analysts and sophisticated equipment. Smaller water systems rely on commercial laboratories for their analysis. What about the private water system owner? Where does the average homeowner with a well fit in with the increasing complexity of water problems? Unfortunately, while the public water suppliers are becoming increasingly aware of new regulations and new testing requirements, many home owners with private well are unwilling to face the reality that their well could be contaminated.

The link between one's physical condition or illness and a contaminated water supply often goes unnoticed until the condition becomes acute or one changes water supplies. While larger cities might take hundreds of samples each month it is not uncommon for well owners to sample on every ten years and sometimes never. The physical effects of drinking contaminated water can be elusive even for those who look for them.

The most common contamination we have found is bacterial rather than chemical. The simplest way to analyze for bacterial contamination is a test for total Coliform. If any Coliform bacteria is found in a well supply it indicates that the well has a connection with an unsanitary source, typically surface water or waste water. Since the Coliform bacteria itself is only an indicator that disease producing microorganisms are likely to be present, the effects of drinking water contaminated with Coliform are as varied as are pathogenic organisms themselves. Another problem somewhat easier to identify is Nitrate contamination. Agricultural areas seem to show a continual rise in the Nitrate levels. Nitrates are most often from fertilization of farmlands. The Nitrates that are not used by the plants find their way under the root system and into the ground water. Excessive Nitrates primarily affect infants, causing methemoglobinemia. The EPA standard is a maximum of 10 mg/L of Nitrate Nitrogen. Certainly, anyone who has a private water supply would want to sample at least once or twice a year for Coliform. The same would be true for Nitrates whenever an infant or pregnant mother will be consuming the water. The Nitrate and Coliform bacteria levels seem to vary greatly with usage or rain patters. Most of the other chemicals seem to be more stable. Therefore, in most cases the other chemical parameters need only be analyzed about every three years. Here is where the homeowner runs into a problem. Out of the tens of thousands of chemicals, which ones should he test for. We have to acknowledge that water is the universal solvent, anything could be in it. Since the financial resources of an individual are limited, a choice has to be made as to what is the most likely to be a problem for them individually. In many areas Volatile Organic Chemicals like TCE are the best choice since they are widely used (21% of the systems EPA surveyed showed traces) and have the ability to move through most soils with relative ease.

Not all contaminants come from the well or from the water company. Much of the country's water has corrosive tendencies. While the water may come into the house pure, the copper, lead and cadmium found in the plumbing system can dissolve and pose a risk to those drinking it, especially children and pregnant mothers. The EPA has been considering tightening the standard for lead in drinking water from 50 ppb to 20 ppb. They estimate that more than 40 million U.S residents use water that contains more than 20 ppb of lead. Testing for these toxic corrosion by products requires a special sampling procedure using water that has been standing in the plumbing as well as after it has been run off.

The responsibility for what comes out of that hole in one's backyard, affectionately referred to as a well, rest in most cases with the individual homeowner. The above mentioned tests for Coliform, Nitrates, Volatile Organic Chemicals, and toxic Corrosion by Products are available through several mail order laboratories throughout the country for about $150 or to put it into perhaps a better health perspective, about less than the price of health insurance for my family of five costs each month. Perhaps we could change the old saying, "an ounce of prevention is worth a pound of cure" to "an ounce of water testing is better than a pound of doctor bills."

Suburban Water Testing Laboratories offers a Suggested Household test which includes: Coliform bacteria, Detergents, Nitrates, Iron, Hardness, pH, and a Volatile Organics scan that consists of 33 compounds for $98 (See enclosed Suggested Tests for Household Use sheet). We also perform a Toxic Corrosion by Products analysis of Copper Lead, and Cadmium for $49 and a double lead analysis for $25. We can be contacted at: 1-800-433-6595 Nationwide or 215-929-3666.

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