Texas Water Resources Institute

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Safe Drinking Water

By Lou Ellen Ruesink, Editor, Texas Water Resources
A drinking water source was once judged "safe" for consumption by the smell or taste of the water--or by observing animals willing to drink from it.

How do you judge the safety of the water you drink? By appearance, odor, or taste? By claims from the supplier? By government regulations and inspections? By reasoning that there have been no recent typhoid outbreaks?

Most Texans assume that water from public supplies is safe. It probably is free from disease-causing bacteria because the use of chlorine has almost totally eliminated waterborne disease from public water supplies.

There is, however, genuine concern in the scientific community that long-term exposure to certain elements found in drinking water--even at very low levels--may be increasing the incidence of cancer and heart disease.

Modern industrial and agricultural activities dump as many as 500 new chemicals and pollutants into drinking water sources each year--some with names we cannot pronounce and effects we cannot begin to predict. Salts and heavy metals contaminate water naturally as it runs off the earth's surface or as it passes through the earth into underground reservoirs. This natural contamination is greatly increased by modern irrigation, mining, and construction activities.

Federal Legislation

Nationwide concern over the safety of public water supplies culminated in the Safe Drinking Water Act passed by Congress in 1974. This act set in motion the first comprehensive national program to safeguard public drinking water and directed EPA to establish minimum drinking water standards for all public water systems.

Under this directive, EPA is establishing maximum contaminant levels for any contaminant in water which might have adverse health effects. The limit on each substance allowed in drinking water is based on the amount a human can consume in a lifetime without adverse health effects. Limits also take into account the amounts to which an individual is exposed from other sources. Maximum contaminant levels have been established for ten chemicals, six pesticides, bacteria, radioactivity, and turbidity.

Bacteria and nitrate are the only two substances which pose an immediate, or acute, threat to health whenever the standards are exceeded. Bacteria can cause waterborne diseases such as typhoid, cholera, infectious hepatitis, and dysentery. Nitrate above a certain level is a threat to children under three months of age causing an anemic condition commonly known as "blue baby" disease.

Other chemicals covered by the EPA drinking water standards are considered harmful if consumed over a long period of time in quantities exceeding the maximum levels. The chemicals with long-term, or chronic, effects are arsenic, barium, cadmium, chromium, fluoride, lead, mercury, selenium, and silver.

Fluoride is a natural mineral and is commonly found in drinking water. In the proper amounts, fluoride in drinking water is advantageous in helping to prevent cavities during formative years and is actually added to many water systems in the state. High levels of fluoride, however, can cause damage to tooth enamel in children up to 12 years of age. According to Floyd H. Williams, Chief of State Drinking Water Program, Texas Department of Health Resources, fluoride is the number one problem in Texas in meeting maximum contaminant level standards prescribed by EPA.

The maximum limits for pesticides in drinking water are ten times lower than it would take to produce any harmful effects. Pesticides covered in the national standards are insecticides: Endrin, Lindane, Methoxychlor, and Toxaphene and herbicides: 2,4-D and 2,4,5-TP Silvex.

Radioactivity has been shown conclusively to cause cancer; however, radiation in drinking water is only a fraction of man's exposure from all natural sources. The effects of long-term exposure to low levels of radioactivity are not yet well defined and there is no "threshold" or minimum considered to be safe. EPA limits are an effort to derive conservative values from the best information available and may be adjusted upward or downward as new and better data become available. The main source of radioactivity in surface water is from nuclear power plants, nuclear fuel processing plants, and fallout from atomic explosives.

Cloudiness, or turbidity, of drinking water is also covered by the national standards. The minute particles suspended in the water that cause turbidity can interfere with disinfection and with bacteria testing.

Aesthtic Standards

Standards relating to the taste, odor, and appearance of drinking water have also been prescribed by EPA, but they will be enforced only if the individual states want to enforce them. Objectionable constituents such as iron and manganese are included in these standards.

All existing standards may be changed and new standards established based on studies being conducted by the National Academy of Sciences, EPA, and others. One such change currently being proposed is the addition of further regulations for organics.

Current standards reflect the best scientific and technical judgment available. They are reviewed by a 15-member National Drinking Water Advisory Council made up of representatives of the general public, state and local agencies, and experts in the field of public water supply.

Two Texans have served on this distinguished council: Henry Graeser, former head of the Dallas Water Utilities Department, and Harold Wolf, professor and head of the Environmental Engineering Division, Civil Engineering Department, Texas A&M University. Wolf currently is a member of the council and serves as chairman of the council subcommittee on training.

State Enforcement

The Safe Drinking Water Act encourages states to accept enforcement responsibility for the regulations. To qualify as a "primary enforcement authority" a state must adopt regulations and enforcement policies that are at least as stringent as those adopted by EPA, provide an emergency drinking water supply plan, and report activities to EPA. Texas assumed this authority for the Safe Drinking Water Act on January 30, 1978. Actually, Texas' stringent regulations for drinking water supplies needed only minor changes to comply with the federal standards.

The inspection and enforcement activities required under the Safe Drinking Water Act will be carried out in Texas by the Division of Water Hygiene, Texas Department of Health Resources. This agency--or its predecessors--has been responsible for the safety of public water supplies in the state since 1916.

Can you be sure your drinking water is safe? Reasonably so, say the experts. Since drinking water is second only to air for man's survival, its effects should be of utmost importance to all.

Protection, Best Policy

Next month Texas Water Resources will look at methods of treatment for drinking water. Since a large part of maintaining safe drinking water is protection of present supplies, the issue will also examine a federal law designed to keep the contaminants from entering the water in the first place.

EPA Standards

Dinking water standards established by EPA in 1977 set maximum limits for a number of contaminants found in water. Limits are in units of milligrams per liter (mg/l). One milligram per liter would equal approximately four drops of a contaminant in a 55 gallon barrel. Public water supplies must not exceed the limits on any of the following contaminants without informing their customers of possible health risks.

Inorganic Contaminants

Arsenic, not to exceed 0.05(mg/l)
Barium, not to exceed 1(mg/l)
Cadmium, not to exceed 0.01(mg/l)
Chromium, not to exceed 0.05(mg/l)
Fuoride, not to exceed 1.4-1.8(mg/l)
Lead, not to exceed 0.05(mg/l)
Mercury, not to exceed 0.002(mg/l)
Nitrate, not to exceed 10(mg/l)
Selenium, not to exceed 0.01(mg/l)
Silver, not to exceed 0.05(mg/l)

Organic Contaminants (Pesticides)

Insecticides

Endrin, not to exceed 0.0002(mg/l)
Lindane, not to exceed 0.004(mg/l)
Methoxychlor, not to exceed 0.1(mg/l)
Toxaphene, not to exceed 0.005(mg/l)
2,4-d, not to exceed 0.1(mg/l)
2,4,5-TP Silvex, not to exceed 0.01(mg/l)

Water For Texas Conference

September 7-8, 1978
Rudder Tower
Texas A&M University

Plan now to attend the 1978 Water for Texas Conference on small town and rural water supply systems. Registration begins at 8:30 a.m., on Thursday, September 7, in Rudder Tower on the Texas A&M University campus.

The conference, which will end at noon on Friday, is sponsored by the Texas Water Resources Institute, Texas Association of Rural Water Corporations, Texas Water Conservation Association, Texas Department of Health, Texas Engineering Extension Service, and Farmers Home Administration. Registration for the conference is $5.00.

Details of the program are available from the Texas Water Resources Institute, Texas A&M University, College Station, Texas 77843.

Stanley Zimmerman, National Water Demonstration Project, heads a group of distinguished speakers. He will keynote the conference with National Rural Water Issues and Programs. The program includes the following speakers and titles.

R. K. Johnson, Executive Secretary, National Rural Water Association--Training and Technical Assistance Training Programs

Charles Sever, Chief of Water Supply Branch, Environmental Protection Agency--The Role of EPA with Small Town and Rural Water Systems Tom Tiner, Texas Department of Health-- Texas Rural and Small Town Water Problems C. K. Foster, Texas Department of Health, and Kenneth Green, General Manager, Texas Association of Rural Water Corporations--Safe Drinking Water Act Implications for Small Towns and Rural Texas Joe Cavness, Director of Accounting Division, Texas Public Utility Commission--Texas Public Utilities Commission's Role in Small Town and Rural Water Systems Raymond M. Litton, Mayor of Round Rock--Water Problems of Small Cities in Texas Bill Lawson, Chief of Community Programs, Farmers Home Administration--FHA's Role in Rural and Small Town Water Systems Danny Burger, Executive Director, Municipal Advisory Council--Small Town Water Systems Can Be Financed Bill Parnell, Manager of Johnson County Rural Water Supply and Vice President of Texas Association of Rural Water Corporations--Practical Problems of Rural Water Systems Leon Holbert, Head, Water and Wastewater Training Division, Texas A&M University--Operators Training for Rural Water Systems Joe Vickers, Consultant Hydrologist, Underground Resource Management; Philip W. Barnes, Principal, Barnes and Co., Bill Lawson, Chief of Community Programs, Farmers Home Administration; and Peck Horton, Manager and Owner, Certified Water Service--Panel on Problems of Consolidation of Rural Water Systems