

**TEXAS COMMISSION ON ENVIRONMENTAL QUALITY**  
**REPORT ON REGULATION OF RADIONUCLIDES AND ARSENIC IN DRINKING WATER**  
Prepared for the  
**Texas Water Advisory Council**  
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### **Radionuclide Regulations**

Texas has had standards for radionuclides in drinking water since 1978. These standards were limited to a standard for combined radium at 5 pCi/L, gross alpha at 15 pCi/L and beta emitters. The beta standard applied only to manmade contaminants in very large water systems and has never been exceeded in Texas.

In 1991, EPA published proposed standards for radium, gross alpha, beta emitters, uranium and radon. This publication proposed a drastic change to the existing standards as well as new radionuclides to be regulated. The effect of these proposed standards, based on the health effects information available at that time, was that adequate health protection could be achieved by enforcing standards which were much higher than the existing Maximum Contaminant Levels (MCLs). This would have had eliminated all but a few violations of the radium and gross alpha standards. Under the proposed standards for radon and uranium, Texas could expect an additional 30 violations for uranium and approximately 850 violations of the radon standard. The radon proposal was subsequently withdrawn. No action was taken on finalizing the other radionuclide standards until December 2000. In the final Rule, published on December 7, 2000, EPA basically reverted to maintaining the existing standards and established a new standard for Uranium at 30 ug/L. The new rule also required more thorough sampling of public water systems. EPA has also issued guidance for calculating radionuclide levels for compliance with the MCLs. The combination of the new standards and sampling requirements as well as the new calculation procedures will result in approximately 100 new violations of radionuclide standards in addition to approximately 35 public water systems that are or have been in violation of the existing standards. Under existing TCEQ policy, calculation of the violation accounts for the reporting error of each radionuclide analysis. Maintaining this calculation procedure will eliminate approximately 35 violations.

Radionuclides in drinking water are a health concern because they produce ionizing radiation which can lead to the promotion of cancer cells. In addition, uranium produces toxic effects to the kidneys. Drinking water is not the only source of ionizing radiation that the general population is exposed to, but at the MCLs, these contaminants produce an unacceptable increase in cancer risk. EPA's methodology for radionuclide health risk conforms with Federal Guidance Report 13, a joint of the EPA, the Department of Defense and the Department of Energy. Although, FGR13 is a consensus document, there has been criticism of the risk assessment methodology. The Texas Radiation Advisory Board in a letter to TCEQ raised concerns over the impact of adoption of the revised radionuclide regulations. One of the main points in their letter was their dissatisfaction with the risk assessment models in FGR 13.

TCEQ staff engaged a group of stakeholders to advise the agency in adoption of the drinking water rules and to assist in the collection of data related compliance alternatives available to water systems. This group has been appraised of the compliance options which include the acquisition of an alternate water supply or treatment options. Treatment technologies for radionuclides are commercially available. However, all treatments which remove radionuclides from drinking water result in a treatment residual which must be managed in a safe and environmentally acceptable manner.

To gather as much information as feasible, TCEQ staff developed a questionnaire pertaining to radionuclide compliance. The questionnaire was distributed to water systems which have at least one source of water which exceeds existing standards or will exceed the standards when adopted by TCEQ. Information from these responses has been used to project the most likely compliance options and to assess costs of compliance. From this data, TCEQ has determined that approximately 100 public water systems will have to address radionuclide compliance issues. From the questionnaire, TCEQ determined that public water systems that exceed the current TCEQ radionuclide regulations will need to spend approximately \$35 million for capital improvements to bring those systems into compliance. There will be an additional \$12 million capital costs to water systems in violation of the new standards based on the new sampling requirements and the new uranium MCL.

Over the last 6 months, a new technology for the treatment of radium has been piloted in Texas. This technology is much less capital intensive, but produces a solid media which must be disposed of. The Operations and maintenance costs of the media replacement and disposal of the media are the controlling cost factors for this technology. Even at that, The company which markets this process indicates that the total cost would range from \$0.60 to \$3.00 per thousand gallons treated, depending on system size and radium concentration. This would push average water bills up from \$8.00 to \$40.00 in those water systems electing this process.

### **Arsenic Regulations**

Texas has had standards for arsenic in drinking water since 1977. The standard of 0.05 mg/L was adopted in the initial state primacy package. It was adopted in response to the National Interim Primary Drinking Water Regulations adopted by the USEPA. The interim standards were carried over from earlier US Public Health Service Standards and adopted without further health study by the EPA.

This standard for arsenic was not modified nationally until January 21, 2001, when EPA published a revised standard for arsenic at 0.01 mg/L (later modified to 0.010 mg/L). The incoming Bush Administration asked that EPA put a "hold" on any implementation of the arsenic regulations to allow for a review of the standard. Ultimately, EPA released a statement retaining the arsenic standard as adopted. This revised standard becomes effective in January, 2006.

Arsenic is a health concern because at high levels there is documented human health data linking exposure to arsenic to an increase in cancer. Arsenic has been linked to cancer of the bladder and skin cancer. The use of high level arsenic exposure data has been questioned by many scientists. The uncertainty in the extrapolation of high dose risk to low dose risk has been questioned in studies of US populations which were exposed to lower levels of arsenic than the studies that EPA used in its evaluation. In at least one study of a US population, there was no significant increase in cancer risk even at levels much greater than 0.010 mg/L.

Arsenic is a widely naturally occurring contaminant of drinking water systems at levels at or near the Maximum Contaminant Level. TCEQ staff has determined that approximately 220 public water systems in Texas will have to address an arsenic exceedance in at least one source of water. Nationally the cost of complying with the arsenic standard has been studied to a much greater extent than compliance with radionuclide rules. TCEQ has used data from these national studies as well as cost estimates from internal data to project the capital cost of complying with the new arsenic standard at approximately \$425 million.

### **EPA Relationship**

TCEQ is the state primacy agency for enforcement of the federal Safe Drinking Water Act. This primacy relationship is defined in the Safe Drinking Water Act and is granted through agreements with the USEPA. As such, TCEQ is compelled to adopt and enforce standards which are no less stringent than the federal standards. Failure to do so by the agency would result in the EPA enforcing the standards in Texas and the probable loss of more than \$6 million in federal drinking water program funding and \$60 million in Drinking Water State Revolving Funds which are granted to the state by the EPA. Although primacy withdrawal is authorized under the Safe Drinking Water Act and the National Primary Drinking Water Regulations, no state to date has had primacy withdrawn for failure to adopt or enforce a national primary drinking water standard. However, EPA has a history of taking enforcement actions against violators in states which fail enforce the standards.

At the time of this document development, the rule adoption by the 49 primacy states are as follows:

Rule	Adopted	Approved by EPA	Extensions granted
Radionuclides	31	10	18
Arsenic	26	5	19

### Compliance Options

Water systems that have sources that violate any kind of chemical contaminant, including radionuclides and arsenic, may address that violation through a number of different mechanisms. Some public water systems have the means already available to manage existing sources to achieve compliance without additional costs. Others will have to obtain additional sources by developing new groundwater or surface water options or purchasing water from another public water system. Others will find that treatment is the only compliance option. In some cases, the cost of any of these options may be so great as make the cost of the project and the associated operation and maintenance costs unaffordable to the customers of the public water system.

In such cases, TCEQ would entertain proposals from water systems to achieve compliance through the use of point of entry (POE) or point of use (POU) devices. Such devices distribute the treatment process to the point where water enters the home (POE) or at a single outlet within the home (POE). Since a smaller fraction of the water is treated, this technology may be more affordable. However, under EPA guidance on the acceptability of these devices, compliance with all the requirements for their use may be unattainable by many water systems.

TCEQ staff has pursued a further acceptance by EPA of the use of bottled water as a long term compliance strategy which could be used by water systems. Though not excluded as a compliance strategy in the Safe Drinking Water Act, EPA regulations do not allow for bottled water to be used in such a manner. TCEQ has asked the Association of State Drinking Water Administrators to develop a new policy statement on the use of bottled water and that this issue be further discussed with EPA.

### Enforcement

TCEQ enforcement against water systems with violations of naturally occurring contaminants such as arsenic and radionuclides is initiated through the mechanism of compliance agreements. This document, which is signed by TCEQ and the public water system sets in motion a series of activities that the water system must pursue. The two major requirements of the water system is that they notify the customers of the violation and that they conduct an economic feasibility analysis of compliance strategies. The

feasibility study must evaluate the projected cost of developing new sources, purchasing new water, treatment, and blending with existing sources. The goal of the compliance agreement is to come to an affordable option for compliance without the need for more formal enforcement action.

For further information on the radionuclide and arsenic regulations, please contact:

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