



FACT SHEET - SULFATE

HIGHLIGHTS OF THE PROPOSED RULE

This proposed rule is an innovative approach to regulating a naturally-occurring drinking water contaminant.

Sulfate, a naturally-occurring anion, is one of the original 83 contaminants whose regulation was mandated by the Safe Drinking Water Act. People who are not accustomed to high levels of sulfate in their drinking water may experience diarrhea when first exposed to it; however, they will generally acclimate to the sulfate in approximately two to three weeks, with no further adverse effect. EPA is proposing an innovative alternative to central treatment which targets those subpopulations likely to be at risk from high sulfate levels in drinking water: newborn infants, travelers, and new residents.

Most of the approximately 2,000 systems expected to exceed the sulfate MCL serve populations of 3,300 people or less. The rule will affect all systems, that is, community systems, non transient, non-community systems, and transient, non-community systems.

The rule proposes a unique means of compliance intended to provide relief and flexibility to small systems. A combination of public education/notification and the provision of alternative water in the form of bottled water which has been monitored or certified to be in compliance with all EPA MCLs, or water treated by a filtering device, is proposed as an alternative to central treatment.

The State would have the authority to allow PWSs to achieve compliance with the sulfate MCL either by using conventional central treatment or by providing Alternative Water/Public Notification. Community Water Systems (CWSs) would be responsible for providing Alternative Water (probably bottled water) on request to any household which has an infant or travelers (guests), and to any household with new residents who have moved to the community from outside the service area. For CWSs, there are four components to the proposed public education and public notification requirement: notices in bills, pamphlets, signs and notices to the media.

Transient systems, which comprise most of the affected systems (1,200 of 1,950), and non-transient, non-community systems would be required to make Alternative Water available for travelers at establishments in the service area. Where the target population is affected on a relatively continual basis, PWSs may find it more cost-effective to provide POU or POE devices. Where the system rarely serves members of the target population, it might choose to have a supply of bottled water on hand. Non-transient, non-community water systems, such as schools, factories and hospitals, might choose to install POEs in their cafeterias. PWSs would be responsible for maintaining POU/POE devices to ensure their continuing effectiveness. Public notification for transient systems and non-transient, non-community systems would consist of permanent signs, made of durable material, in places such as rest areas, campgrounds, gas stations and public areas. The signs would state the nearest location of drinking water for individuals not acclimated to high sulfate levels. If the location has a POE device, posting would not be necessary, since all taps would provide water that complies with the MCL. In the case of campgrounds, sources such as handpumps or trailer hook-ups would be posted with signs, and bottled water could be available at the entrance gate or registration area.

There are no reports of adverse health effects from chronic exposure to sulfate in drinking water. Sulfate is a normal component of human body fluids, and is found naturally in soil and in combination with several minerals in the environment. The laxative effect of ingesting high levels of some sulfates is well known.

The total target population, consisting of newborn infants, new residents and travelers who would be exposed to sulfate levels in excess of 500 mg/L, is estimated to be 1.2 million people. Most of these people are tourists and business travelers, with 27,000 infants included in the total.

There are insufficient data to calculate a precise and reliable quantification of the exact dose which will cause diarrhea in a given percentage of the susceptible population. As the mechanism of sulfate action is known, there is apparently little interest in the medical community in additional research on the subject.

Acclimation to sulfate is assumed due to the fact that people living in regions with high-sulfate drinking water seem to have no adverse effect, whereas newcomers drinking that region's water will initially experience the laxative effect.

There are three documented case histories of infants, 5 to 12 months old, who were given formulas prepared with water containing 630 to 1,150 mg/L of sulfate (Chien, et al., 1968). These infants developed diarrhea shortly after they ingested the formula, but the effect subsided after use of the high sulfate water was discontinued. Cole (1992) evaluated this study and concluded that neither the potential effects of osmolarity, specifically hyperosmolarity, nor viral gastroenteritis had been considered as possible causes of the observed diarrhea. Thus, Cole suggested and the Agency agrees that the Chien study provides qualitative evidence of the effects of sulfate but should not be used quantitatively in a sulfate

risk assessment. In another study, Peterson (1951) compiled the results of questionnaires sent to North Dakota residents and concluded that "waters with 600 to 750 ppm sulfates should be looked upon with suspicion as they may or may not be laxative. Over 750 ppm sulfates is generally a laxative water and below 600 ppm sulfates should be considered safe." Moore (1952) replotted the Peterson data and found that as sulfate concentrations increased from 500 to 1000 mg/L, the number of adults reporting laxative effects also increased. At concentrations of sulfate above 1,000 mg/L, the majority of respondents noted a laxative effect.

The Agency is using these studies to support the MCLG, although each has limitations. The Agency is convinced that the level of 500 mg/L is sufficiently protective of infants and adults.

The total annual cost of reducing sulfate exposure to the target population is estimated to be \$86 million. Of this total, implementation of the unique, proposed option is estimated to cost \$7 million. The Agency assumes that, despite the availability of this unique option, approximately 25% of the affected systems would choose either central treatment or regionalization, for a cost of \$71 million. National monitoring costs are estimated to average \$0.5 million per year, and annual State drinking water program costs to implement the rule are estimated to be \$7 million. If central treatment were the only means of compliance with the sulfate rule, annual national cost would be \$147 million.

In addition to the principal option, other options being seriously considered by the Agency are described. Two of the other options limit the delivery of alternative water to newborn infants as the population subgroup for whom diarrhea can be life-threatening. The implementation of either of those two options would cost a total of \$16 million.

For more information, contact the Safe Drinking Water Hotline, 1-800-426-4791.

