



FACT SHEET - SULFATE

An Innovative Approach to Regulating a Naturally-Occurring Contaminant

What is sulfate?

Sulfate is a naturally occurring ion found in combination with metals in the form of salts. Sulfate salts with lower molecular weight metals such as sodium, potassium, and magnesium are very water soluble and are often found in natural waters. Salts of higher molecular weight metals such as barium, iron or lead have very low water solubility.

Why is sulfate proposed for regulation?

In 1974, Congress passed the Safe Drinking Water Act (SDWA), whose goal is to ensure that all Americans can enjoy healthy and palatable drinking water. The SDWA requires EPA to set Maximum Contaminant Levels (MCLs) or specify treatment techniques for contaminants that "may have any adverse effect on the health of persons and which are known or anticipated to occur in public water systems." These are called National Primary Drinking Water Regulations (NPDWRs) for contaminants in public drinking water supplies. EPA may specify treatment techniques when it is not "economically or technologically feasible" to derive MCLs. The 1986 amendments to the SDWA required EPA to issue a proposed and final standard for sulfate because of its known adverse health effects.

What are the health effects?

There are no known chronic adverse health effects from exposure to sulfate. The acute effects from exposure to high levels of sulfate range from soft stools to diarrhea. Sulfate salts, such as magnesium sulfate, are used as medicinal laxatives. The effect is temporary, and lasts approximately two weeks while the intestinal system acclimates. People who are accustomed to the high-sulfate water experience no ill effects. The target population susceptible to the effect consists of newborn infants, travelers and new residents in areas of the country with high sulfate levels. Infants consume more water on a body weight basis than adults, and consequently ingest a higher dose of sulfate (per body weight) in drinking high-sulfate water. In infants, the greatest risk is from dehydration and electrolyte imbalance that may result from diarrhea.

What are the sources of sulfate?

Sulfate is found in soil sediments and rocks, and occurs in the environment as a result of both natural processes and human activities, such as mining.

How is sulfate used?

Sulfate is used for a variety of commercial purposes, including pickle liquor (sulfuric acid) for steel and metal industries, and as a reagent in manufacturing of products such as copper sulfate (a fungicide/algicide).

Has sulfate been released to the environment?

Specific data on the total production of all sulfates are not available, but production is expected to be thousands of tons per year. Sulfate may enter surface and ground water as a result of discharge or disposal of sulfate-containing wastes. In addition, sulfur oxides produced during the combustion of fossil fuels are transformed to sulfuric acid in the atmosphere. Through precipitation (i.e., acid rain), sulfuric acid can enter surface waters, lowering the pH and raising sulfate levels.

What happens to sulfate when it is released to the environment?

Sulfate exists naturally in water and in human bodily fluids. In soil, sulfate may re-enter water and move downward into ground water. Sulfate compounds do not readily evaporate from surface waters and soils.

What are the proposed means of compliance?

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 EPA MCLs, or water treated by a filtering device, is proposed as an alternative to central treatment. Central treatment options are reverse osmosis, ion exchange and electrodialysis reversal.

What are the proposed monitoring requirements?

Monitoring requirements for nondetecting systems or systems with best available technology (BAT) installed are shown in the table below. Systems adopting the proposed method of compliance, alternative water and public notification/education, would not be required to monitor after the initial monitoring, because they would be providing the target population with water that complies with the sulfate MCL.

Drinking Water Source	Initial Frequency	Repeat Frequency	Triggers
Ground Water	One sample once every 3 years	One sample every 9 years after 3 rounds of non-detection	> 500 mg/L
Surface Water	One sample annually	One sample every 9 years after 3 rounds of non-detection	> 500 mg/L

Is additional information available?

Yes, additional information regarding sulfate in drinking water is available from numerous sources, including those listed below.

- * EPA's toll-free numbers for further information on drinking water quality, treatment technologies, health advisories and other regulatory information.**
 - ▶ Safe Drinking Water Hotline -- 800/426-4791**
 - ▶ National Pesticides Hotline -- 800/858-7378**
 - ▶ Toxic Substance Control Act Information Line -- 202/554-1404**
 - ▶ Toxics Release Inventory, National Library of Medicine -- 301/496-6531**
- * Agency for Toxic Substances and Disease Registry -- 404/639-6000**

