

BE ON THE TEAM TO THINK DOWNSTREAM: SULFATE

WHAT IS SULFATE?

Sulfate is a naturally occurring compound that is found through mineralization and oxidation of natural landscapes. It can also be found in organic matter decomposition in environmental systems. Sulfates are nutrients for many organisms and can stimulate plant growth. It is critical to understand the sources of sulfate to better understand the impact and mitigation techniques to be applied.

During the sulfur cycle, there is a release of hydrogen sulfide gas from the decomposition of organic matter in swamps.
Photo by M.P. Hayes



WHAT AFFECTS THE PARAMETER?

There are two pathways for sulfate introduction to water systems. First is natural erosion, mineralization or oxidation from land and rock-based landscapes. Runoff introduces natural sulfate to the water column, which can provide valuable nutrients to organisms. The second form is from anthropogenic input, such as industrial point source

discharge, landfills, agricultural fertilizers, detergents and septic systems. Sulfate from these sources can be more concentrated and persistent in environmental systems. This can be used as an indicator for untreated wastewater systems or leachate from industrial operations.

WHERE DOES IT COME FROM BROADLY AND SPECIFICALLY TO LOUISIANA?

In Louisiana, 2.1% of waterways are impaired because of sulfate. This compound can come from natural sources like mineral dissolution and sulfide oxidation and from anthropogenic activities. The leaching of sulfate from natural systems or transport through pumping in canals contributes to the suspension in the water column. The Louisiana Department of Environmental Quality uses the Water Quality Integrated Report to identify impairments and sources. The following sources were identified as causing sulfate impairments around the state:

- Source unknown
- Forced drainage
- Golf courses
- Landfills
- Natural source
- Industrial point source
- Silviculture resuspension or harvesting

HOW DOES IT AFFECT THE SURROUNDING ENVIRONMENT?

Though sulfate is a beneficial nutrient at low concentrations to many organisms and plants, excess concentration can have negative impacts. It can lead to lower pH, which can be toxic in environmental systems can leading to food web disruption, ecosystem balance and aquatic

organisms stress. Excess sulfate can also fuel sulfate-reducing bacteria, which increases the production of methylmercury that accumulates in fish. Overall, balancing sulfate in the environment is crucial to promote its use as a nutrient and to reduce the potential for toxicity.

WHAT ARE TRADITIONAL MANAGEMENT PRACTICES?

Depending on the setting, best management practices for sulfate reduction include physical processes and soil management techniques. This can include neutralizing soil acidity, aeration and adequate moisture content. For industrial sulfate inputs, it is best to consult treatment

techniques to ensure the processes are optimal. In the case of using chemical treatment to mitigate sulfate in waterways, consult a licensed specialist to identify the proper concentration of the additive and the procedure for application.

RESOURCES

<http://www.deq.louisiana.gov/page/louisiana-water-quality-integrated-report>
https://www.epa.gov/sites/default/files/2014-09/documents/support_cc1_sulfate_healtheffects.pdf
https://www.epa.gov/sites/default/files/2014-09/documents/support_cc1_sulfate_dwreport.pdf

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