

## **ANAEROBIC BIO-OXIDATION CAUSE AND CONTROL OF INHIBITION OF SULFATE REDUCTION AT LOW (BUT NOT 0) AND HIGH SULFATE CONCENTRATIONS**

**David B. Vance\***  
ARCADIS-US, Inc.  
1004 North Big Spring Street  
Suite 300  
Midland, TX 79701  
Voice: 432-687-5400  
Fax: 432-687-5401  
[dvance@arcadis-us.com](mailto:dvance@arcadis-us.com)

Anaerobic Bio-Oxidation is an increasingly recognized method of bioremediation for groundwater impacted by petroleum hydrocarbons and other xenobiotic compounds such as MTBE. A number of groundwater anaerobic bio-oxidation remediation programs have been undertaken with sulfate reduction the dominant approach.

Sulfate driven remediation has been demonstrated using sulfate natural to the groundwater system, by injection of highly soluble sulfate salts, or the addition of gypsum in excavations. Anaerobic Bio-Oxidation is proving to be a robust technology, both because the effectiveness of the biodegradation processes and the chemical and physical attributes associated with high solubility and conservative transport within impacted water bearing zones.

However, there are critical limits to the efficacy of sulfate reduction processes at both the low and high ends of the applicable concentration range. There is a definitive lower effective limit for stimulating sulfate reduction near 20 mg/L. At sites where high concentrations of sulfate are available and hydrocarbons are present, sulfate reduction may be inhibited by hydrogen sulfide. The core of this paper is to use some field examples that demonstrate both the low and high sulfate concentration effects as well as discuss the causes and, in the case of the high concentration range, potential control.

###