

# REDOX TECH, LLC



*"Providing Innovative In Situ Soil and Groundwater Treatment"*

## **Sulfate BioChem (SBC)**

Recent applications of in situ chemical oxidation (ISCO) have shown that ISCO can be a cost-effective remedial strategy for organic contaminants in groundwater and soil. The application of ISCO to contaminated source areas usually results in an immediate benefit to groundwater in the area. Redox Tech originally formulated a mixture of sodium persulfate and calcium peroxide called Oxygen BioChem (OBC) that is an effective amendment for ISCO applications. Some situations are not appropriate for chemical oxidation because strongly reducing conditions can translate to prohibitive oxidant demand and corresponding cost. As an alternative to direct chemical oxidation we have developed **Sulfate BioChem (SBC)**, which works with naturally reducing conditions to promote anaerobic biological oxidation of organic compounds.

The mixture in SBC supports anaerobic oxidation conditions and delivers oxygen (soluble sulfates) for long-term biological oxidation under anaerobic conditions. SBC contains several soluble sulfur salts each with a different purpose. Magnesium sulfate (epsom salts) provides the main source of sulfate electron acceptors as well as magnesium, which is essential for cell growth and function. Other sulfur compounds in the mixture help to achieve and maintain the proper redox conditions for anaerobic oxidation of petroleum compounds by sulfate reduction. During anaerobic oxidation, the petroleum utilize the oxygen on the sulfate to convert to harmless carbon dioxide and water.

The long-term remediation process is biological oxidation. Based on Weidemeier et al. (1999), more than 70% of the natural attenuation of fuels results from sulfate reduction. In addition, there are many descriptions in the literature of the addition of soluble sulfate to successfully remediate petroleum contaminated sites (e.g., Reinhard et al., 1997; Anderson and Lovely, 2000; Somsamak et al., 2001; Sublette et al., 2006). The site described by Reinhard et al., 1997 is in a similar geologic setting near sensitive coastal use areas. We have used sulfate reduction to remediate sites to closure.

SBC has advantages over other formulations used for bioremediation in that it provides soluble sulfates and compounds that help **develop and promote** the necessary redox conditions to sustain oxidation by sulfate reduction. SBC is ideally suited for the treatment of **BTEX**, and **MTBE**, as well as **naphthalene** and other **PAHs**. SBC is highly soluble and safe to handle so it is very easy to inject.

### References

1. Weidemeier et al., 1999, Natural Attenuation of Fuels and Chlorinated Solvents in the Subsurface, John Wiley and Sons, New York.
2. Anderson and Lovely, 2000, Environ. Sci. Technol., 34, 2261-2266.
3. Reinhard et al., 1997, Environ. Sci. Technol., 31, 28-36.
4. Somsamak et al., 2001, FEMS Microbiology Ecology, 37, 259-264.
5. Sublette et al., 2006, Ground Water Monitoring and Remediation, 26 (2), 70-78.