

# The Use of Nitrate for the Control of Sulfide Formation in Oklahoma Oil Fields - Annual Report

**Period Covered by the Report:** July 1, 1999 to June 30, 2000

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**EPA Grant Number:** R827015-01-0

**Title:** The Use of Nitrate for the Control of Sulfide Formation in Oklahoma Oil Fields -

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**Institutions:** University of Oklahoma

**EPA Project Officer:** Bala Krishnan

**Project Period:** July 1, 1999 to June 30, 2000 (N/C Ext. July 1, 2000 to June 30, 2001)

**Project Amount:** \$51,068

**Research Category:** Control of souring

**Objectives of the Research Project:** In this project we investigated, how relevant is the use of nitrate as a preferred electron acceptor to control the metabolic activity of sulfate reducing bacteria to selected oil fields in Oklahoma.

## Progress Summary/Accomplishments:

We were planning to proceed with field trials during the fall, but the period of heavy rains did not permit us to do so. Severe winter conditions did not improve the situation and we were practically unable to start field experiments. However, we continue to monitor the rates of sulfate reduction, potential nitrate reduction and cell numbers of sulfate-reducing bacteria (SRB) and nitrate reducing bacteria (NRB). In the samplers taken in wintertime the rates were lower, than in September but all tendencies were the same (Table 1). The rate of sulfate reduction in the oil-water separator was one order of magnitude higher than in the wellhead samples. Also, in oil-water separator SRB again exceeded NRB in two orders of magnitude. The existing pattern argued that major sulfate reduction occurred in aboveground facilities.

Table 1

Sampling Site	Sulfate Reducing Activity ( $\mu\text{M S/d}$ )	Potential Nitrate Reducing Activity ( $\text{mmol/L/d}$ )	NRB (cell/ml)	SRB (cell/ml)
Well 1	0.077	0.034	$2.5 \times 10^2$	$2.5 \times 10^3$
Well 2	0.034	0	$2.5 \times 10^5$	$4.5 \times 10$
Oil/Water separator	0.988	0.02	15	$2.5 \times 10^3$

**Publications/Presentations:**

Davidova, I.; M.S. Hicks; P.M. Fedorak, and J. M. Suflita, The influence of nitrate on microbial processes occurring in oil industry production waters. In progress

**Supplemental Key Words:**

Sulfate reduction, nitrate reducing bacteria, microbial processes, biogeochemical, oil-water separator, oxidation, electron acceptor