

## **EXPERIMENTAL ANALYSIS OF ENVIRONMENTAL FACTORS AFFECTING MICROBIAL DEGRADATION OF OIL TO METHANE: CHEROKEE BASIN, KANSAS**

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The proposed project examines controls on microbial conversion of crude oil into methane in middle-Pennsylvanian strata in the Cherokee Basin, Kansas. Specifically, we propose to test the following hypotheses: (1) microorganisms in the strata are capable of generating methane by degrading crude oil and (2) potential controls on the rate of methane formation include formation water chemistry, nutrient abundance, and carbon dioxide abundance.

To test the following hypotheses, we will complete the following objectives: (1) collect fresh samples of oil, formation water, and microorganisms from two commercial gas wells (to be completed 02/05/2015); (2) prepare laboratory bioreactors; (3) monitor gas composition in each reactor over time; (4) terminate incubation and collect water, oil, and microbe samples; and (5) analyze samples using geochemical and microbiological techniques

By comparing the results of these analyses between treatments and to samples collected from each well initially, we will be able to evaluate underlying geochemical and microbiological factors that may lead to differences in the rate of methane formation between treatments. Water chemistry data will allow us to evaluate geochemical constraints on microbial activity in each bioreactor. High resolution GC data will allow us to evaluate whether different treatments affected which hydrocarbon component was degraded. Microbial community analysis will constrain whether different treatments stimulated groups that helped degrade oil more rapidly.