

Treatment of Produced Water Using a Surfactant-Modified Zeolite/Vapor-Phase Bioreactor System

FEW04FE10-5

Program

This project is a subcontract to the University of Texas, DE-FC26-02NT15461, which was selected in response to DOE's solicitation DE-PS26-02NT15373, Focused Research in Air Quality and Produced Water Management in Oil and Gas Exploration and Production, May 3, 2002.

Project Goal

The project goal is to develop the use of a surfactant-modified zeolite (SMZ) and vapor-phase bioreactor (VPB) technology combination to remove and destroy organic compounds from coproduced water from oil production.

Performer

Los Alamos National Laboratory (LANL)
Los Alamos, NM

University of Texas
Austin, TX

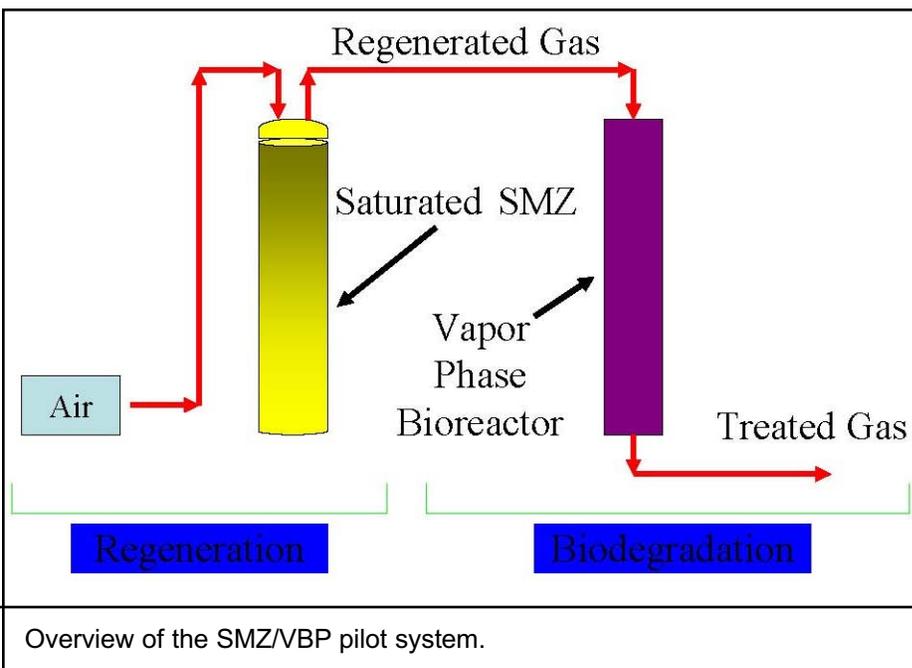
Project Results

The pilot system has been built, and pilot testing originally was to have started in New Mexico in May 2005. However, testing was deferred pending placement of the pilot SMZ/VPB system at Burlington Industries' McGrath saltwater disposal facility near Farmington, NM.

The change in schedule will not affect the completion date of the project. LANL has identified testing laboratories for additional field water testing and is providing a field gas chromatography unit for gas testing at the site. At this time no regulatory issues have arisen, due to the permitted status of the McGrath facility.

Benefits

Reuse of produced water will greatly impact production costs in the oil and gas industry. In the United States, the average production of produced water is 10 barrels of water for each barrel of oil. The SMZ/VPB technology is designed to allow onsite treatment of produced water as an



alternative to disposal. The process will reduce production costs and provide beneficial reuse of the water.

Background

SMZ is an innovative filtration/sorption medium that has been shown to remove contaminants such as benzene, toluene, ethylbenzene, and xylenes (BTEX) from produced waters. Cost-effective operation of an SMZ requires a method of regenerating the SMZ onsite. The air-sparging method, developed as part of the joint University of Texas and LANL project, can regenerate SMZ. The process generates a moist air stream contaminated with relatively low concentrations of volatile organic compounds (VOCs), including BTEX, that must be removed. These VOCs are biodegradable and present in small concentrations. The VPB is used to eliminate the pollutants created during the the SMZ regeneration.

Project Summary

From work accomplished under the University of Texas contract DE-FC26-02NT15461, LANL was to provide cost data from a survey of producers with respect to treatment and disposal of produced water. This ensures an accurate basis for estimating the feasibility of the treatment technology for end users. LANL also is working with other partners on the final design parameters and operating variables for the field-scale column test and participating in the field demonstration.

The first main tasks of the project have been completed: the cost data survey, an economic and engineering assessment, and a feasibility evaluation and engineering cost estimate. Phase 4 and Phase 5 reports covering these tasks remain to be finished, as they await completion of field pilot testing.

Under the second group of tasks, LANL provides support for field pilot testing and larger-scale, long-term testing at McGrath. The water from the McGrath facility is the same water that ultimately would be sent to Public Service Company of New Mexico (PNM) for use as power plant cooling tower water make-up.

The second group of tasks is split into two time periods:

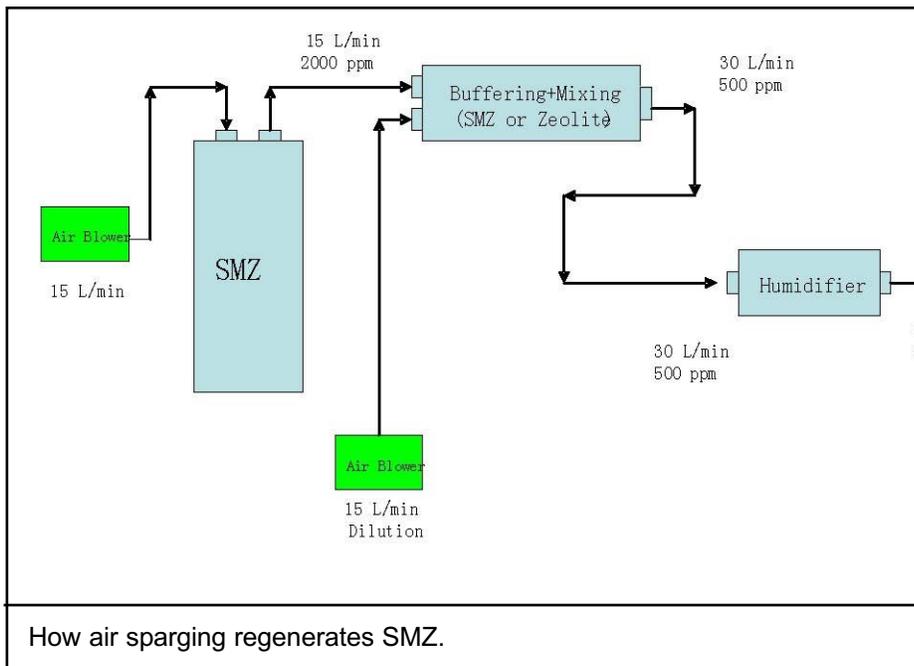
- Months 1-12: LANL provides input on material requirements with respect to the reverse osmosis membranes, PNM's requirements, and other design requirements that require interface with other system components and with the PNM site processes. If other sites are involved, then LANL coordinates with those sites to facilitate the work.

- Months 13-27: LANL continues as the contact point between PNM or any other field sites and the project. LANL also provides safety training for students as needed and field supervision of portions of the set-up and start-up of the field system.

Moving field testing to the McGrath facility allows researchers to perform the pilot test and the larger-scale, long-term testing at the same facility, leveraging the cost share from Burlington Industries and using the same source water for both projects. Because the water from the McGrath facility is the same water that will be sent to the PNM Four Corners power plant, that should allow an efficient move for the technology to the PNM location when the utility has produced water onsite.

Current Status (October 2005)

Currently, all tasks are on schedule. This project is a subcontract to DE-FC26-02NT15461, University of Texas.



Project Start: November 12, 2004
Project End: January 31, 2006

Anticipated DOE Contribution: \$108,000
Performer Contribution: \$0

Contact Information
 NETL – Jesse Garcia (jesse.garcia@netl.doe.gov or 918-699-2036)
 LANL – Enid Sullivan (ejs@lanl.gov or 505-667-2889)