

LEAD AGENCY: U.S. Air Force

LAB: Armstrong Lab

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PROBLEM STATEMENT: In situ bioremediation of fuels requires adequate nutrient and electron acceptor addition to enhance natural biodegradation. Current methods of in situ biological treatment often fail to provide adequate electron acceptor to metabolize fuel contaminants in groundwater. Problems with the rapid decomposition of hydrogen peroxide, nutrient-induced plugging, and poor oxygen distribution have all been documented in previous field studies. This is a continuation of a FY93 SERDP funded project.

PROJECT DESCRIPTION: This project will demonstrate novel methods of introducing nutrients and oxygen (or another suitable electron acceptor) into an aquifer contaminated with jet fuels. The approach will be to use lab testing (if recommended by review panel) to develop improvements to nutrient formulations and new methods of providing an electron acceptor in situ. Field studies will be performed utilizing in situ monitoring systems to provide real-time measurement of CO₂ production by microbes, in situ oxygen levels, and contaminant removal. The project will be composed of 3 tasks: task 1 will be an expert panel meeting to review the state-of-the-art and define promising ideas yet to be field tested; task 2 will be the development of a nutrient/electron acceptor delivery system controlled by in situ monitors; task 3 will be the successful pilot-scale test, the integrated system which can monitor and feed back information on subsurface environmental conditions so an in situ bioremediation technology can be run in the most effective manner. This project directly contributes to the objectives identified in the Tri-Service Environmental R&D Strategic Plan, Pillar 1: CLEANUP: Requirement Thrust 1.J: Treatment of Fuels in Groundwater.

EXPECTED PAYOFF: These improvements to in situ biodegradation will provide Air Force and DoD engineers with a more reliable and less expensive alternative for removing fuels from groundwaters.

TRANSITION PLAN: This project will transition to the Air Force Environmental Systems Program Office (HSC/YAQ) and the Air Force Center for Environmental Excellence (AFCEE/ES) for full scale remediations and finalization of the technical data package. A preliminary Principles of Practice Manual, Technical Reports and professional publications will be produced for distribution to all DoD IRP offices and the appropriate Army, Navy, AF, DOE, and EPA technology transition offices.